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ANNUAL REPORT

OF THE

Department of Agriculture

OF THE

PROVINCE OF ONTARIO

1915

VOL. II.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by A. T. WILGRESS, Printer to the King's Most Excellent Majesty
1917

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ANNUAL REPORT

OF THE

Bureau of Industries

FOR THE

PROVINCE OF ONTARIO

1915

PART I.—AGRICULTURAL STATISTICS
PART II.—CHATTEL MORTGAGES

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO;
Printed by A. T. WILGRESS, Printer to the King's Most Excellent Majesty
1916

Printed by
WILLIAM BRIGGS
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TORONTO

To His Honour Sir John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

Lieutenant-Governor of the Province of Ontario, etc., etc.

May It Please Your Honour:

I have the honour to present herewith for your consideration the Report of the Ontario Bureau of Industries for the year 1915.

Respectfully yours,

Jas. S. Duff,

Minister of Agriculture.

Toronto, 1916.

Ontario Bureau of Industries

PART I.—AGRICULTURAL STATISTICS.

THE WEATHER.

Temperature.—The following table gives the temperature of the Province of each month during the last five years, together with the mean annual temperature, also the mean temperature for the six months April-September—practically the growing season—together with the average for the five years 1911-15, and the thirty-four years, 1882-1915:

Month.	1915	1914	1913	1912	1911	1911–1915	1882–1915
	°	°	°	°	°	°	°
January	18.7	20.9	26.1	7.7	20.8	18.8	18.0
February	22.7	10.7	15.4	13.6	21.1	16.7	17.2
March	27.3	27.4	29.0	21.1	26.2	26.2	26.8
April	48.6	39.7	44.3	39.5	40.6	42.5	41.8
May	50.9	57.0	52.4	54.9	59.9	55.0	53.7
June	61.0	63.1	63.2	60.0	64.1	62.3	63.5
July	66.9	67.5	68.1	67.8	70.1	68.1	68.0
August	64.2	65.9	66.4	62.2	67.7	65.3	65.4
September	61.5	58.8	57.8	60.7	58.2	59.4	59.3
October	50.0	50.8	49.4	49.3	46.9	49.3	47.3
November	39.1	34.5	40.3	37.1	32.7	36.7	35.3
December	23.9	21.3	29.3	28.0	30.0	26.5	23.7
Annual mean	44.6	43.1	45.1	41.8	44.8	43.9	43.3
Mean for 6 months, April to September	58.8	58.7	58.7	57.5	60.1	58.8	58.6

The mean temperature for the year 1916 was 44.6 degrees, being 1.5 degrees higher than the preceding year, and 1.3 degrees higher than the normal for the thirty-four years 1882-1915.

The mean temperature for the six growing months, April-September, was practically the same as the previous year, and only 0.2 degrees higher than the thirty-four year normal. April was the warmest month relatively, being 6.8 degrees in excess of average; May was the coldest relatively, being 2.8 degrees below its normal.

SUNSHINE.—In the following table the averages of sunshine are, as usual, derived from the records of the weather stations at Woodstock, Toronto, Lindsay, Kingston and Ottawa:

Month.	Sun above horizon.	1915	1914	1913	1912	1911	1911-1915	1882-1915
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
January	285.7	73.1	66.0	61.3	98.7	79.2	63.1	75.0
February	291.4	92.7	148.8	111.8	109.7	89.9	110.6	104.4
March	369.9	197.0	128.9	106.7	181.2	159.4	154.6	144.2
April	406.4	186.9	137.6	207.5	177.3	192.3	180.3	184.1
May	461.1	222.4	263.0	241.4	188.9	272.2	237.6	211.4
June	465.7	267.4	262.1	315.5	281.6	215.3	268.4	248.3
July	470.9	236.1	266.0	297.5	264.2	303.1	273.4	266.7
August	434.5	194.4	223.7	257.6	153.8	247.1	215.3	239.2
September	376.3	195.3	210.8	213.4	114.0	190.7	184.8	186.5
October	340.2	146.9	137.5	121.4	147.3	150.9	140.8	139.5
November	286.9	92.6	83.9	95.1	82.9	75.0	85.9	78.8
December	274.3	64.3	66.1	78.6	52.4	65.3	65.3	60.8
Total for the year	4463.3	1969.1	1994.4	2107.8	1852.0	2040.4	1980.1	1938.9
Total for six months, April to September	2614.9	1302.5	1363.2	1532.9	1179.8	1420.7	1359.8	1336.2

The year 1915 had 1,969.1 hours of sunshine, or 30.2 hours more than the average for the last thirty-four years. The six growing months, April-September, had 1,302.5 hours of sunshine, or 33.7 hours less than the average for the 1882-1915 period. The four months January, February, July and August did not exceed their normals, August being the lowest with a deficiency of 44.8 hours; all the others were above, March being the highest with an excess of 52.8 hours.

PRECIPITATION.—The fall of both rain and snow for the five winter months, including November, 1914, and March, 1915, is given in the following table for five years, together with the average for the thirty-four years, 1882-1915. An inch of water is equivalent to ten inches of snow:

Months.	1915	1914	1913	1912	1911	1911-1915	1882-1915
November:	in.	in.	in.	in.	in.	in.	in.
Rain	1.81	2.78	2.66	2.52	1.35	2.22	2.03
Snow	7.7	3.8	7.4	13.4	12.8	5.0	7.5
December:							
Rain	0.43	0.23	1.18	1.44	0.09	0.67	1.16
Snow	17.2	6.8	11.2	9.1	22.9	13.4	15.1
January:							
Rain	0.90	0.56	2.45	0.44	0.76	1.02	0.98
Snow	16.3	21.5	13.6	25.4	9.9	17.3	17.5
February:							
Rain	1.29	0.24	0.31	0.08	0.40	0.46	0.79
Snow	10.7	12.1	13.2	16.8	15.6	13.7	15.1
March:							
Rain	0.18	0.88	2.82	0.20	0.96	1.01	1.18
Snow	5.1	11.2	13.8	14.1	13.3	11.5	8.6
Five months:							
Rain	4.61	4.69	9.42	4.62	3.56	5.38	6.14
Snow	57.0	55.4	59.2	78.8	74.5	60.9	63.8

The total amount of rainfall for the five months, November-March, was 4.61 inches, or 1.53 inches below the average for the thirty-four years, 1882-1915.

The total amount of snowfall was 57.0 inches, or 6.8 inches below the average, November and December were in excess, the others being all several inches below.

The six months, April to September, however, comprise what is regarded as the growing season for most crops, and the following table gives the rainfall of these months for the last five years, 1911-1915, and for the thirty-four years, 1882-1915.

Months.	1915	1914	1913	1912	1911	1911–1915	1882–1915
	in.	in.	in.	in.	in.	in.	in.
April	1.15	1.93	2.77	2.24	1.58	1.93	1.75
May	2.18	1.99	1.93	5.08	2.08	2.65	2.81
June	3.06	2.39	1.77	1.56	2.30	2.22	2.71
July	3.86	1.41	2.46	2.61	2.30	2.53	2.82
August	5.54	3.81	3.43	4.33	2.29	3.88	2.70
September	3.39	2.28	1.64	3.98	2.77	2.81	2.61
Total for six months	19.18	13.81	14.00	19.80	13.32	16.02	15.40

The rainfall for the six months, April-September, comprising the growing season, was 19.18 inches, or 5.37 inches more than the previous year, and in comparison with the normal for the thirty-four year period was 3.78 inches in excess. April and May were the only months which were below average, the others ranged from 0.35 inches to 2.84 inches above.

VEGETATION AND SPRING SOWING.

Vegetation.—Unusually warm weather in April brought growth forward with a bound, and correspondents writing about the middle of May reported vegetation as being a week or two in advance of the ordinary, although the cold dip then prevailing had halted advancement. Cattle had then been on the grass in some localities for a fortnight, with good picking.

Spring Sowing.—The May bulletin said: "Reports regarding spring crops are almost an unbroken chorus of praise for the excellent condition of the soil at seeding, and the generally successful nature of the catch. Sowing was unusually early, as most of the spring grains were in, and some of them nicely started by the 1st of May. More land than usual is being put to crop this year, and beans especially will experience a considerable increase in acreage judging by expressed intentions. On the other hand, potatoes will be the one crop likely to have a reduced area, owing to the poor prices realized for last year's crop."

STATISTICS OF FIELD CROPS.

The following table gives the acreage, production and market value of the field crops of Ontario for the year 1915. Detailed tables showing the statistics by counties will be found elsewhere in this report.

Crops.	Acres.	Bushels.	Bushels per acre.	Market Value	
				Total.	Per acre.
				$	$ c.
Fall Wheat	811,185	24,737,011	30.5	24,023,286	29 62
Spring Wheat	162,142	3,439,949	21.2	3,392,996	20 93
Barley	552,318	19,893,129	36.0	11,130,811	20 15
Oats	2,871,755	120,217,952	41.9	47,452,121	16 52
Peas	126,943	2,043,049	16.1	3,302,641	26 02
Beans	62,863	882,819	14.0	2,745,106	43 67
Rye	173,736	3,210,512	18.5	2,532,051	14 57
Buckwheat	193,497	4,278,366	22.1	3,057,398	15 80
Corn (for husking)	309,773	21,760,496	70.2	9,885,292	31 91
Potatoes	173,934	13,267,023	76.	10,805,026	62 12
Carrots	2,439	686,232	281.	85,779	35 17
Mangel-wurzels	50,799	25,356,323	498.	2,028,505	39 93
Turnips	97,451	46,598,851	478.	4,659,885	47 82
Sugar Beets	22,890	8,644,281	378.	1,080,535	47 21
Mixed grains	475,738	19,461,609	40.9	10,602,271	22 29
		tons.	tons.		
Corn (for Silo)	443,736	4,874,377	10.98	12,185,943	27 46
*Hay and Clover	3,231,752	4,253,763	1.32	61,704,769	19 09
Totals:					
1915	9,762,951			210,674,415	21 58
1914	9,621,444			199,152,945	20 70
1913	9,541,537			168,455,253	17 65
1912	9,574,474			185,790,341	19 40
1911	9,718,741			179,974,358	18 52
1910	9,725,684			175,115,742	18 01
1909	9,578,323			167,966,577	17 54

* Including alfalfa.

The acreages devoted to other crops in 1915 were as follows: Orchards, 288,825; small fruits, 23,443; vineyards, 10,276; gardens, 57,774; rape, 40,613; flax, 5,334; hops, 453; tobacco, 5,503 (Essex, 2,824; Kent, 1,774;); summer fallow, 226,217; pasture (cleared), 3,350,420.

THE GRAIN CROPS.

The New Fall Wheat. The wheat crop sown in the fall of 1914 was thus described in the November bulletin of that year: "At the time of writing fall wheat never promised better, nor have returns been more unanimous. The ground at seeding was in fine tilth, and the catch was perfect. Copious rains and warm weather brought the young fields along in splendid form, until now the only fear is that the luxuriant growth may have given the plants too much top for entering the winter. A few complaints are made of the Hessian fly and the wireworm, but only slight injury has been done by these or other insects. The season of 1914 may indeed be described as peculiarly a new fall wheat one, the present condition of the fields never being better, while the increase in acreage is one of the largest on record. Sowing ranged from the last week of August to the end of September, most of the seed being got in during the first two weeks of the latter month. Dawson's Golden Chaff is the variety most largely grown, although about forty other kinds are named. It is estimated that the increase in the area of fall wheat now in crop will be about 140,000 acres, or a little over 20 per cent."

The April bulletin had the following reference to the young wheat: "The fields were well protected by snow until the middle of March, when in many sections they became comparatively bare, and suffered more or less from alternate thawing and freezing, cold winds, etc., causing some heaving and considerable browning of the top. The hope was entertained, however, that warm rains and good growing weather later on would revive these more backward fields, as the tops only seemed affected. Late sown fields are the least promising. At present there is no cause for anxiety as to the condition of the main crop."

Reports sent in about the middle of May were to the following effect: "This important grain crop, with its largely increased acreage, gives promise of an unusually good yield should favorable weather ensue. It wintered well, and evidently was not much injured by 'heaving' during the very open weather of March-April. In fact, spring injury may be regarded as practically nil. Hardly any fall wheat land has been plowed up, and very little has been re-drilled to spring grains. Injury from insects, also, has been slight, only the barest mention being made of the presence of the wire-worm, cut-worm, or Hessian fly. While a few patchy fields in low-lying places are reported, the opinion is very generally expressed that the crop never looked better at this time of the year. Some correspondents are inclined to fear that growth has been rather too rank."

The August bulletin said, of fall wheat: "This crop, with a greatly enlarged area, gave promise also of one of the largest yields per acre for the Province until the wet weather developed. Being very full in the head like most of the other grains, where the crop was cut late it was knocked down considerably by rainstorms, ripened rather unevenly, and was difficult to harvest. As the rains were almost continuous during the harvest season a large portion of the crop had to remain in the fields for a long time after cutting, and more or less sprouting in the shock resulted; but the actual extent of injury to wheat or other grain from this cause cannot be fairly estimated until the crops are more fully examined. One correspondent, however, speaks of the sprouted wheat as making good hog feed, thus helping to minimize the loss. Odd mention only was made of the Hessian Fly in Elgin and Wellington, while scattering references were made to smut as showing in four or five counties. Harvesting spread from 20th of July to the middle of August."

The November returns regarding the crop were thus summarized: "Threshing returns prove the yield of fall wheat to be considerably above the average per acre, but the quality of the grain is said to run unevenly. While much of the wheat is of the very finest quality, a good deal of the grain was affected by wet weather at harvesting, especially on low-lying spots, became more or less sprouted, and some of it was rather damp at threshing. All the inferior wheat, however, will be required for feeding live stock on the farm, and for this purpose will be practically as good as the better quality, so that the actual loss will be relatively small. The acreage of fall wheat cut this year was unusually large."

The New Fall Wheat. The following regarding the prospects of the newly planted fall wheat appeared in the November bulletin: "The acreage of wheat now growing for 1916 crop will be about three-fourths of that of the area cut in 1915, and will also be less than the acreage in 1914. In some localities the land was too wet for early sowing, and considerable of the seed was put in later than usual, the result being that a portion of the crop has not as much top at present as is generally seen. The fields look thrifty on the whole, however, and the crop promises to enter the winter in vigorous shape."

Spring Wheat. "This crop, unlike the other cereals, has been losing in favor, especially in the western part of the Province, but there has been an increase in acreage this war year," said the August bulletin. "The yield per acre will be relatively large, but the quality of the grain will be more or less affected by harvest conditions, which were practically the same as those of fall wheat. Grasshoppers also did injury to this crop in some of the St. Lawrence and Ottawa counties. Cutting began in the last week of July, but some was yet uncut when reports were sent in."

Returns made by correspondents in November were to the effect that spring wheat had an experience similar to that of fall wheat: a good yield, but an uneven quality of grain, owing to the wet weather at harvesting.

Barley. The August bulletin remarked: "A large yield of plump grain per acre, much of it discolored, with the gathering in difficult and slow owing to 'lodging' and other untoward harvesting conditions already described, tells the story of this crop. Harvesting started in the last week of July and was still in progress at the end of the second week of August."

According to November reports there was a splendid yield of barley, but much of it was discolored by the rain. As most of the barley is now fed to stock the matter of color is of much less importance than when the crop was raised chiefly for malting purposes.

Oats. "As most of the oats were standing when the heaviest rain storms came," said the August bulletin, "the crop suffered perhaps more than any other of the grains from this cause. The yield per acre is reported to be large, although some speak of the grain as having a tendency to shell in the field, where much of the crop has been lying out awaiting more favorable weather for hauling in. Smut has been more frequently reported than usual, and several correspondents attribute this to the neglect of treating the seed with formalin. Some of the straw has been broken, and will hardly be up to the average in feeding quality. Harvesting has been going on from the beginning of August, and will continue well into the third week. Cutting was extremely difficult on the soft land until the 12th of the month, and the unusually wet condition of some fields has caused trouble all along."

Dealing with oats, the November bulletin said: "This crop, like other cereals, suffered from wet weather—perhaps more so—yet the net result is on the whole satisfactory. The yield per acre is much over the average in spite of the fact that a good deal of the crop was knocked down by the heavy rain storms, and that owing to delayed harvesting there was considerable shelling. The grain on the whole is of good weight and general quality, especially where the seed was treated for smut, which was more in evidence than for many years in some localities. Rust was also complained of by several correspondents."

Winter Rye. According to the April bulletin rye appeared to have come better through the winter than either wheat or clover, and gave promise of being a good crop.

"This is not now regarded by the majority of farmers as a regular grain crop. Its experience this season has been practically identical with that of fall wheat," was the statement made in the August bulletin concerning rye.

The comment regarding rye appearing in the November bulletin was also brief: "This is not a popular crop where raised for grain, but the season's result in both yield and quality is about an average."

PEAS. Except where grown for canning factories, peas are decreasing in popularity. The August bulletin said: "While there was too much rain for best results the crop is regarded as doing fairly well, although complaints are made by some of late podding and of mildew. The pea aphis is still reported in several districts east and west. Most of the regular field peas remain to be pulled."

The November bulletin thus referred to peas: "This crop is rapidly decreasing in favor in Ontario, and although an average yield is reported, farmers do not appear to be enthusiastic over the results. It is a satisfaction to know, however, that little or nothing is said about the weevil."

BUCKWHEAT. Buckwheat has been gaining in favor of late years, but the experience of this season has not been encouraging. There was a rank growth of straw, but the general quality of the grain was not up to the mark. Some of the crop was caught by frost, and a number of fields were difficult to harvest on account of being flattened by rain and windstorms.

MIXED GRAINS. Late barley and early oats are named as the grain mixture that is best for growing together, ripening most evenly, and giving the best feeding value for live stock. The practice is strongly recommended by some correspondents.

BEANS. August reports regarding beans were not satisfactory. The crop was not expected to be up to the mark either in yield or quality. Late planted fields looked best. The ground had been too wet for cultivation, which was much missed. Complaints were also made of insect pests and rust.

The November bulletin said of beans: "The season was too wet for the best results, for while the yield will be about an average, the beans are more discolored than for many years, and with this crop appearance is a very important factor."

CORN. A cold June and a wet, dull July told against corn in its first stages. "The consequence is," remarked the August bulletin, "that the crop is about a week backward, and is rather uneven, especially on low land. Considerable corn has been blown over by rainstorms, and cutting will likely be more difficult than usual. The wet midsummer also prevented proper cultivation, and corn fields became very weedy. The white grub and wire worm were reported in a few places as causing injury, but correspondents are this year silent regarding the crow. Corn is now doing well, and favorable weather from now on may yet redeem the situation."

The November bulletin had the following regarding the crop: "Reports vary as to the quality of corn, there being some complaints of soft cobbing owing to the long rainy season; but taken all together the crop may be counted a satisfactory one. Silo corn has done relatively better than that grown for husking, and this year's ensilage will be unusually well cobbed. Some late corn got caught by frost, but the amount of actual injury from this cause is not reported to be serious. Cutting was more difficult than usual, as much of the crop had been blown over by rain storms."

HAY AND CLOVER.

"Clover did not make a good catch last year," said the April bulletin, "especially in the eastern portion of the Province, owing to the unusually dry summer, and as a consequence new fields were not so well prepared for the trying open spring weather. More or less heaving has occurred in every district, and while a number of correspondents report fields as giving good promise the prospects of the crop, taken as a whole, are not so encouraging as might be desired. However, favorable spring weather may yet put a brighter face on the situation."

According to the May returns nearly all the injury to clover occurred from drouth either last year or the season before, as the crop wintered well. While some spring heaving was reported, it was not so serious as usual, and the remarkably early growth had very fully compensated for any losses in that way. The crop was then looking unusually well, although thin on the ground in places, owing to the poor catch at sowing. Taken all together the May reports regarding clover were the most cheerful for years.

The August bulletin said: "The first cutting of hay will be heavier than that of the last two years, although not up to the average of the Province for the thirty-three years 1882-1914. Several correspondents, however, look for an unusually large second cut. Those who cleared their fields early were fortunate, as owing to the rainy weather the hay harvest dragged through the latter part of July in many localities, making curing difficult, and in some cases almost impossible. On low lying lands there was trouble in working the reaper. The season has been a good one for 'seeding down,' however, and new meadows are receiving a more favorable start than for years. Alfalfa has done well this season."

Clover Seed. Clover did better for a second cutting of hay than it did for seed. Threshing results have been comparatively light. The frequent rains made too rank a growth of plant, and much of the seed failed to mature, notwithstanding the promising bloom. Alsike was much better for seed than red clover.

Alfalfa. Like clover, this crop had a poor catch last year, but otherwise it came through the winter and spring in fair condition. It appears to be steadily growing in favor as a fodder crop, although some unfavorable reports have been received as to its suitability to local conditions.

FIELD ROOTS.

Potatoes. The August bulletin said: "At the time of reporting, potatoes gave promise of an unusually good yield. The tubers so far are generally a fine sample, although already some complaints are made of rot and blight, and more is feared where the fields are low-lying or poorly drained, as the land there is still very wet. The tops have grown unusually long this season, and owing to the frequent rains washing off the poison-sprays the "bugs" have been very plentiful in many quarters."

The November returns were thus summarized: "This crop was a most promising one early in the season, but the unusually wet condition of the soil, especially on heavy clay land and in low-lying spots, induced rot to such an extent that the net result may be termed a failure. Some fields are described as not being worth digging, and others as barely returning seed, while a few correspondents report excellent yields on high sandy ground. Early planted potatoes did much better than those put in later."

Roots. The following appeared in the August bulletin: "Taking the Province over, all classes of roots look well. In fact, many fields are found with too heavy a growth of top. The rows, also, are very weedy, as in most cases cultivation was almost impossible. There were complaints of poor germination of mangel seed in some sections of the Lake Huron district, and of injury to roots by the cutworm in Lennox and Addington; but these and other minor drawbacks were only local in character, and do not seriously affect the general good outlook for the root crops."

The November bulletin had the following regarding roots, according to class:

Turnips. This class of roots may be described as a fairly good crop in every way. While all other roots were housed somewhat earlier than usual, some fields of turnips remained to be got under cover.

Mangels. Mangels are relatively a better crop than turnips, the description of the crop running from fair to excellent.

Carrots. Field carrots are not now largely raised, but they have done fairly well this season.

Sugar Beets. This crop shows an increased acreage, and the general quality of the roots was good, while the yield per acre was about an average.

MISCELLANEOUS.

Tobacco. "This crop, which is grown chiefly in the County of Essex, has had a rather unfavorable experience so far," said the August bulletin, "the early summer having been too wet and cool for best results. It will require almost continuous good weather now to bring the crop along to a satisfactory condition."

According to November returns the growing of tobacco was decreasing in favor. Some correspondents spoke of a fair yield of good quality, but the general result had not been encouraging, owing chiefly to the rough, rainy weather of August.

Flax. The acreage given to this crop is now very small. Harvesting was delayed by rains, which also caused considerable lodging, but some of the crop had been pulled when correspondents wrote about the middle of August. A few of the returns described the stalks as being rather short and uneven, but others spoke of the crop generally as looking well. In a few localities early frosts wrought injury to the young fields.

Threshing and Marketing. "Threshing has been later than usual," said the November bulletin, "chiefly on account of the delayed harvest, but also because of the largely increased acreage of grain crops. While some place threshing as only about two-thirds done, many correspondents report operations as completed. Marketing has not been heavy, as unsatisfactory prices for grain and tempting offers for all classes of live stock have induced most of the practical men to feed grain in large quantities—to 'market on foot,' as one correspondent pointedly puts it. While much of the grain is rather soft for milling purposes, there is enough of first-class quality on hand to meet the demand, should the market prices take an upward turn."

Fall Plowing. The November bulletin stated: "The gathering of the unusually heavy harvest, made more tardy still by the almost continuous wet weather then prevailing, has thrown all fall work on the farm more or less late. The land is also heavier than usual for plowing, especially on clays, being somewhat sodden on low-lying fields, or packed hard where dry, owing to the heavy pounding of the frequent rains. The weather, however, was promising as later correspondents wrote, and plows were going lively all over the Province during the first week of November, with good prospects of catching up to the acreage desired to be turned under."

Farm Improvements. Tile draining is described by a correspondent as "A mortgage-lifting scheme," and judging by the number of traction ditchers reported to be at work in the Province this year many farmers agree with that sentiment. The very wet season, however, while emphasizing the need for field draining, hindered the work greatly, but a considerable quantity of tile was laid by hand as well as by machine, and the probability is that next year will see more draining than ever done by farmers. A fair amount of improvement has been made in farm dwellings, barns, etc., and considerable wire fencing has been done, but not so much as usual, owing to the heavy work of harvesting, the long spells of wet weather, and the fact that many young men have left the farm during the year for the battle front.

FRUIT AND FRUIT TREES.

The following was contained in the April bulletin: "Fruit trees so far have not suffered much from the winter, especially where care has been given the orchards, although complaints of serious injury from San José Scale come from some of the Lake Erie counties. A few complaints have been made of injury to peach buds in some localities in south-western Ontario, but so far the peach orchards of the Niagara peninsula have been practically unscathed from this cause. Several reports were made of girdling of young fruit trees by rabbits and mice, more especially in the county of York. Fruit bushes have come through the winter in good shape, but some correspondents speak of injury to strawberries from severe open weather in March where not mulched."

The May bulletin said: "Correspondents making returns regarding fruit conditions up to the 15th of May report prospects as generally favorable. Peaches, cherries, and plums had been in generous blossom, and in most instances had set safely, while apples and pears were coming into bloom, although not so profusely. Up to that date practically no injury had been done by cold spring weather, and it is thought that the light frosts since reported will do little damage to the tree fruits. More anxiety is felt regarding strawberries, as in some places between Toronto and Hamilton the old fields, which blossom first, were caught by late frosts, although the newer fields, planted last spring, largely escaped. Up to the time of writing injury to strawberries in the Niagara district is said to be comparatively light. Bush fruits and vines are promising, although some complaints have been received of the winter-killing of raspberries. The presence of the tent caterpillar is noted in several counties."

August returns were to the following effect: "Late frosts at the time of blossoming caught a number of fruit trees. Winter apples will be scarce, while fall and summer varieties are in fair quantities, although there have been many windfalls. A number of complaints are made of scab, and in some of the St. Lawrence and Ottawa counties the tent caterpillar is reported as having done considerable injury. Pears, like apples, will be only a moderate crop. Peaches will be fair in yield and so far promise to be of fine quality. Plums range from poor to plentiful in yield, according to location and variety, and the same may be said of cherries. Grapes are also a variable crop, many vines having been caught by frost this spring. Small fruits generally were generous in yield, although many of the strawberries and raspberries were more or less unfit for market owing to the rains hindering picking at the time of ripening."

The November bulletin said: "Where orchards have been taken care of they have done well, but where untreated the San José Scale and the tent caterpillar have wrought considerable harm. There has been a comparatively small yield of apples, especially of the winter-keeping varieties. The high winds in the late summer caused many windfalls. Pears were in fair quantity, while plums and peaches were more plentiful, and of excellent quality. Grapes were only medium in yield, and were unusually slow in ripening, but escaped serious attacks of frost. Small fruits did well, although considerably affected by rain at ripening."

PASTURES, LIVE STOCK, AND THE DAIRY.

The wintering of live stock, owing to the light hay crop and the poor summer pastures of last year, depended largely upon ensilage, straw, roots and other roughage, of which, happily, there was more than an average supply, as many farmers were chary in using grain owing to the high prices prevailing during the winter. The following regarding live stock appeared in the April bulletin:

"As a class horses have come through in generally good shape, although a number of minor cases of distemper have been reported. Working horses, particularly, are said to be in excellent fettle, although perhaps not so heavy as usual, as owners have in most cases been sparing with feed.

"Cattle also have come through the winter in fair condition—healthy but somewhat thinner than might be desired, owing to the high price of grains and mill feeds. All ailments have been of local nature, no serious outbreak of disease being reported. Fat cattle were picked up in large numbers in the fall—some of them rather unfinished—especially in counties near the border; but in some sections a fair supply is yet on hand. Store cattle are not so plentiful as formerly, and graziers are anxious to get them on the grass owing to the scarcity of hay and the high value of grain. Many of these animals are younger than usual, and some correspondents point out that, owing to the large number of milch cows now in use, grazing cattle are tending more toward the dairy type. It is also stated that farmers are holding on to their cows in the dairy counties owing to the good prospects for cheese, and that more calves are being retained than formerly.

"Sheep have been wintered better than any other class of live stock. They are doing well, and lambs are coming strong. The dread of the dog, however, is very apparent in reports of correspondents, and it acts as a brake on progress of the sheep industry of the Province.

"Hogs have been kept thinner than usual, but it is said that they have suffered less from crippling than for several winters past. The high cost of grain has caused many animals to be turned off in a somewhat unfinished state. A few spring pigs have died, but no serious disease is at present affecting swine."

The August bulletin said: "The frequent rains since the second week of July made good midsummer pastures. In fact, the fields have been so soaked in most localities that the grass, while very succulent, is said to be somewhat lacking in substance. Pastures are now promising in appearance, although some report that the tramping of the grazing animals in the soft fields has done more injury than usual to the growing grass. There are good prospects for fall and winter fodder supplies should silo corn, which is a little late in growth, safely mature, but some fear that much of the straw, for both fodder and bedding, will be inferior in quality owing to long exposure in the fields. Live stock have practically a clean bill of health, and are generally thrifty in appearance. The remarks of correspondents on the dairy situation are on the whole most cheerful, owing to the present good flow of milk and the brisk demand for all its products. Some correspondents are concerned over the scarcity of young cattle to renew the dairy herds."

November reports regarding live stock and their prospects were cheerful: "Fall pastures were never better in the opinion of those reporting. The consequence is that all classes of live stock are in good form, with remarkable freedom from disease. Many young cattle, mainly two-year-olds, have been sold off the grass, and more calves are being kept than in former years. There are not more than enough beeves on hand for the expected call. Sheep have been in good demand, especially in the matter of lambs, which in many cases are now finished off on rape. Hogs are being shipped regularly, and while some correspondents report a scarcity of young pigs, others claim that there is a normal supply on hand. Silos are being erected all over the Province in larger numbers than ever."

METHODS OF FEEDING. The April bulletin had the following: "Nearly every farmer has his own plan of feeding, and the methods reported vary from careful stall care, the ration being well balanced and nourishing, to a feed of chopped straw and ensilage or some other roughage, with perhaps a trifle of hay or crushed grain, just sufficient to bring the animals over to the grass. Some breeders of sheep and cattle speak well of rape for fall pasture, while advocates of the silo for general use are more enthusiastic than ever. There does not appear to be as much grain fed to live stock as in more recent years, except where they were being finished for delivery. Judging by the reports of correspondents, however, it is plain that a great advance has been made during the last few years in the economic wintering of all classes of stock while yet bringing them through in fair shape for early pastures."

FODDER SUPPLIES IN APRIL. The bulletin issued in that month said: "The fodder supply at the present time is largely a matter of local—or individual—experience. Hay and straw, where not too freely sold to pressers at tempting prices, will be sufficient in most cases, and there will also be enough coarse grains on hand to meet requirements. Progressive farmers have an ample supply of roots for all needs, while the excellent crop of corn last year ensures an abundance of either ensilage or dry fodder. In this connection a correspondent tersely remarks: 'Ensilage solves the feed problem.'"

FODDER SUPPLIES IN MAY. The May bulletin said: "There will be a sufficiency of grain, hay, and other fodders to meet all demands on the farm, and in some quarters a surplus for market if the prices there pay better than feeding does. Of course there has been a pinch in some individual cases, but most Ontario farmers are now experienced and wise in the matter of wintering live stock. The shortage of straw was felt in some localities, but the other fodders were well supplemented by the good corn supply. The early grass has been helping out the hay nicely."

Fodder Supplies in November. Late fall conditions were thus summarized: "There is a relatively large supply of fodder on hand, owing to the fine crop of corn and the large quantity of grain caught by the wet weather and rendered inferior for marketing purposes, but good for feeding to live stock. Neither hay nor straw are up to the standard in feeding quality. The usual quantities of mill feeds, such as bran and shorts, and gluten, linseed and cottonseed meals, oil cake, etc., will be purchased to balance or enrich the rations."

Dairying. The following, touching more particularly upon dairying, appeared in the November bulletin: "This year the milch cow is queen. The Province never has had such a season for dairy products. Owing to the excellent condition of pastures up to the present the flow of milk has been unusually full and steady, and in some factories as much cheese was made in October as in August. In fact, cheese factories, creameries, and condenseries have been going ahead all season at full speed, the product being generally of good quality, and the prices most satisfactory to producers. As a Norfolk county correspondent tersely puts it: 'The dairy business is all right.' Holsteins are the most popular breed of dairy cattle in Ontario."

Poultry. Correspondents are divided regarding the profit from fowl, and many poultry keepers make no record whatever of results. Several correspondents, however, place the net gain per hen per annum at a dollar. Pure-bred fowl are being kept in greater numbers by farmers, some attributing this to the influence of school fairs, while better care is also given on this account. This season there have been more complaints than usual of poor hatching. There has been a good demand for crate-fattened fowl, and geese appear to be coming more into favor with farmers; but turkeys do not seem to be so popular as formerly.

PATRIOTISM AND PRODUCTION.

The strong desire of the agricultural authorities, both federal and provincial, to increase the amount of production in both field and stable, owing to the war conditions then prevailing, led to a vigorous campaign among farmers during the fall and winter of 1914-15 along the lines of what was called "Patriotism and Production." The following regarding the results of this movement appeared in the April bulletin:

"Correspondents are not unanimous regarding the response to the call for a larger production. A few are outspoken against the movement, fearing over-production with a lowering of prices, but the great majority of those reporting heartily endorse the 'Patriotism and Production' idea, and it is certain that there will be a substantial gain in the quantity of most of the commodities raised this year on Ontario farms.

"Fall wheat already shows a decidedly increased area. More fall plowing than usual was done, much of it with old sod, and while this may mean an increase of grain (especially of oats), and of corn or roots, it will also mean to some extent less pasture. In the cannery districts a smaller acreage will be devoted to supplying the factories and more attention will be given to raising general farm crops. The cheese season will be earlier than usual, and this will require an increased production of milk and consequently a greater consumption of fodders.

"Several correspondents point out that some of the gain in crop production will come not so much from an enlarged area as from a better selection of seed, a more careful preparation of the seed-bed, and a more thorough cultivation of the growing crops. They say that poor seed and poor tillage have been responsible for many of the poor yields of the past.

"One drawback to farm crop development is the lack of competent labor, for while help is offering fairly freely it often lacks quality.

"Not only in field work, but in the orchard and the stable, the idea of improvement and increase seems to have taken hold of many, and the year 1915 promises to be one of the busiest in history of the agriculture of the Province."

STATISTICS. The following table gives the total numbers and value of the several classes of live stock and poultry on hand July 1st, 1915, together with live stock sold or slaughtered in the year preceding that date:

Live Stock.	Live stock on hand, July 1, 1915.		Sold or slaughtered in year ending June 30, 1915.	
	No.	Value.	No.	Value.
		$		$
Horses (all ages)	779,131	107,982,037	75,527	11,003,822
Cattle:—				
Milch cows	1,022,518	62,196,964	875,394	43,678,233
Other cattle	1,652,228	53,166,372		
Sheep and lambs	908,095	6,403,907	489,320	3,289,701
Swine (all ages)	1,769,295	17,562,726	2,110,936	31,628,772
Poultry (all kinds)	14,273,091	7,670,326	6,764,069	4,161,695
Totals:				
1915	....	254,982,332	....	93,762,223
1914	....	250,870,078	....	93,017,235
1913	....	237,591,885	....	89,651,016
1912	....	225,848,942	....	84,982,339
1911	....	214,720,424	....	80,675,390
1910	....	194,416,037	....	71,833,731

The values for the several classes of poultry on hand July 1st, 1915, were as follows: Turkeys, $756,837; geese, $455,532; ducks, $282,589; other fowl, $6,175,368.

VALUE PER HEAD. The following table gives the average value per head of live stock and poultry for 1914 and 1915, and at five-year intervals.

Live Stock.	Live stock on hand July 1.					Sold or slaughtered in year ending June 30.				
	1915	1914	1910	1905	1900	1915	1914	1910	1905	1900
	$	$	$	$	$	$	$	$	$	$
Horses (all ages)	139	145	128	110	76	146	154	136	119	79
Cattle:—	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Milch cows	60 83	57 01	40 76	35 05	31 01	49 90	47 14	37 44	36 23	32 12
Other cattle	32 18	30 81	22 43	21 29	17 93					
Sheep and lambs	7 05	6 67	5 75	4 68	4 29	6 72	6 29	5 36	4 28	3 64
Swine (all ages)	9 93	10 14	8 50	6 44	5 42	14 98	15 26	12 49	9 79	7 69
Poultry (all kinds)	54	53	43	34	29	62	62	51	39	37

LABOR AND WAGES.

In dealing with this question the August bulletin said: "On some farms there was at times an actual scarcity of help, owing to remoteness from centres of population or the rush to get in the grain during the short open weather; but on the whole there has been a sufficiency of farm labor this summer, although much of it was lacking in quality. Farmers are trying to meet the help question by using more labor-saving machinery, exchanging work with neighbors, and using all the members of the family—sometimes the females—at busy periods in the fields. There is also more planning to raise a line of crops that will require less help in handling. Farmers' sons are said to be more numerous at home than in recent years, owing to slack business conditions in the cities and towns. Wages during harvest are about as usual, running from $1.25 to $2.00 a day (with board), and from $20.00 to $35.00 a month, according to the experience and quality of the worker."

The November bulletin stated: "During the early part of the season there was a sufficiency of farm labor, much of it of an indifferent quality, but a considerable number of young men have enlisted from Ontario farms, and in many quarters there was a scarcity of labor for fall work, which has been heavier than usual, owing to the big and very much delayed harvest. Wages are not likely to rise or fall materially, except where local conditions may influence for the time being. Farmers are again putting more land into pasture, which will require less help, and improved machinery is steadily diminishing the demand for manual labor. It is almost impossible to secure domestic servants for rural districts."

TEMPERATURE OF 1915.

TABLE I.—Showing for each month the highest, lowest, mean daily range and mean temperature at the principal stations in Ontario for 1915; also the annual mean for each station.

Months.	Southampton.	Chatham.	London.	Woodstock.	Stoney Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Haileybury.
January:	°	°	°	°	°	°	°	°	°	°
Highest	40.4	42.0	41.0	42.5	46.0	46.7	40.6	40.0	41.5	40.0
Lowest	-0.1	-17.0	-21.0	-18.0	-3.0	-1.0	-17.0	-34.0	-24.0	-35.0
Daily range	13.3	15.2	17.2	16.0	13.7	14.1	18.4	21.6	16.0	20.4
Monthly mean	20.9	21.8	19.2	18.3	23.4	23.7	17.3	15.4	15.3	11.7
February:										
Highest	47.0	55.0	48.0	43.0	44.0	42.3	43.2	47.0	41.0	42.0
Lowest	-2.0	3.0	-3.0	-8.5	-6.0	2.9	-14.0	-22.0	-12.0	-20.0
Daily range	25.4	15.1	14.2	14.4	12.1	11.5	17.9	23.6	14.9	20.6
Monthly mean	19.7	30.0	26.2	23.6	25.6	26.0	20.6	18.8	19.8	16.7
March:										
Highest	42.8	56.0	52.0	45.0	49.0	49.0	49.1	46.0	45.0	51.0
Lowest	10.1	10.0	8.0	7.0	14.0	10.6	2.5	-2.0	4.0	-5.0
Daily range	12.4	17.8	17.0	15.3	13.3	15.1	18.7	23.0	16.0	21.7
Monthly mean	26.5	32.3	28.7	27.4	30.3	30.0	25.3	21.9	26.4	23.9
April:										
Highest	81.0	91.0	87.0	83.0	86.0	83.7	87.4	84.0	86.2	88.0
Lowest	23.1	25.0	21.0	23.0	26.0	26.5	21.6	15.0	26.0	15.0
Daily range	18.0	23.9	23.1	19.8	20.1	19.0	23.2	26.4	20.4	26.7
Monthly mean	46.9	52.6	48.1	48.9	50.0	49.8	48.3	45.0	49.0	47.2
May:										
Highest	76.2	79.0	78.0	73.5	79.0	74.4	78.1	77.0	75.0	79.0
Lowest	28.1	30.0	27.0	30.0	31.0	32.9	27.9	23.0	33.0	26.0
Daily range	19.8	22.3	24.2	19.9	21.0	19.1	23.5	26.3	20.0	25.9
Monthly mean	48.3	53.9	52.1	50.3	52.0	52.1	50.8	48.2	51.6	49.2
June:										
Highest	86.0	88.0	87.0	82.0	88.0	82.0	86.0	84.0	85.0	90.0
Lowest	36.1	39.0	34.0	36.0	38.0	42.9	38.1	35.0	47.0	37.0
Daily range	19.9	25.2	26.1	21.7	21.3	21.8	27.4	28.5	21.5	27.4
Monthly mean	57.8	64.2	61.9	59.7	59.8	62.2	61.4	58.4	63.5	60.9
July:										
Highest	82.9	92.0	89.0	82.0	89.0	86.5	88.6	87.0	88.0	90.0
Lowest	46.2	48.0	45.0	46.0	49.0	50.9	45.5	43.0	49.5	42.0
Daily range	16.0	21.6	21.3	17.1	19.3	18.2	23.5	27.3	20.0	28.1
Monthly mean	63.9	70.9	68.2	66.0	68.6	68.4	66.5	63.6	67.6	64.9
August:										
Highest	82.9	92.0	89.0	82.0	89.0	86.5	88.6	87.0	88.0	90.0
Lowest	38.6	38.0	35.0	37.0	41.0	40.2	36.0	32.0	40.0	35.0
Daily range	13.2	20.9	20.3	15.0	15.5	16.3	22.0	21.5	15.8	20.6
Monthly mean	61.8	68.0	65.6	64.1	66.8	66.3	62.0	62.2	63.1	62.3
September:										
Highest	87.3	91.0	89.0	84.0	88.0	87.3	85.9	87.0	88.0	89.0
Lowest	32.9	34.0	29.0	32.0	35.0	31.4	29.0	26.0	36.0	30.0
Daily range	18.1	21.4	23.0	16.9	18.9	19.2	23.9	23.7	18.7	21.5
Monthly mean	60.1	66.5	63.2	61.6	63.9	63.3	60.1	57.8	60.8	58.1
October:										
Highest	77.0	79.0	76.0	73.0	77.0	73.7	72.7	71.0	71.5	73.0
Lowest	28.1	27.0	24.0	27.0	29.0	30.2	23.9	23.0	26.5	23.0
Daily range	15.1	19.6	20.2	15.7	17.8	16.3	20.2	20.5	16.9	18.2
Monthly mean	50.4	54.0	50.1	49.1	52.4	51.9	48.4	47.1	49.2	47.3
November:										
Highest	66.0	69.0	64.0	64.0	65.0	61.3	59.1	62.0	61.0	59.0
Lowest	16.0	25.0	22.0	21.0	20.0	23.7	11.8	12.0	16.5	9.0
Daily range	13.2	14.6	15.0	13.1	14.1	11.8	17.1	14.0	12.2	11.2
Monthly mean	39.9	42.3	39.4	37.9	40.5	40.7	44.0	37.1	35.6	33.4
December:										
Highest	38.4	43.0	37.0	40.3	49.0	40.6	40.1	37.0	37.0	32.0
Lowest	5.9	12.0	2.0	-1.0	5.0	9.8	-8.5	-9.0	-8.5	-11.0
Daily range	10.2	11.3	11.3	10.9	10.8	10.8	16.7	15.7	13.0	14.3
Monthly mean	26.5	28.3	25.1	24.5	27.8	27.6	21.4	20.0	21.0	17.0
Annual mean	43.6	48.7	45.7	44.3	46.8	46.8	43.8	41.3	43.6	41.0

AVERAGE TEMPERATURE FOR THIRTY-FOUR YEARS.

TABLE II.—Showing for each month the monthly average for the highest, lowest, mean daily range and the mean temperature at the principal stations in Ontario, derived from the thirty-four years, 1882-1915; also the annual mean at each station for the same period.

Months.	Southampton.	Chatham.	London.	Woodstock.	Stoney Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Haileybury.
January:	°	°	°	°	°	°	°	°	°	°
Highest	44.9	46.3	46.6	46.6	50.7	45.6	41.9	41.7	40.4	38.3
Lowest	— 6.7	— 9.2	—10.1	—11.2	— 4.6	— 7.3	—20.3	—27.6	—21.3	— 33.7
Daily range	14.6	12.1	15.1	16.4	14.3	14.5	17.7	20.6	17.8	23.6
Monthly mean	21.1	21.4	21.6	20.3	25.3	22.3	16.0	14.2	11.2	6.7
February:										
Highest	44.3	46.7	46.2	45.3	47.9	44.5	41.9	42.1	40.1	41.3
Lowest	—11.6	—11.3	—11.2	—11.4	— 6.4	— 8.1	—18.6	—27.6	—20.6	— 34.7
Daily range	16.9	13.9	16.8	17.1	15.5	15.3	19.6	22.4	18.4	23.3
Monthly mean	19.0	19.8	20.1	19.0	22.6	20.9	15.3	13.6	12.5	9.6
March:										
Highest	53.8	57.9	58.3	56.1	59.7	56.0	51.5	50.6	48.2	50.6
Lowest	— 2.8	— 1.3	— 0.2	— 1.0	5.6	4.1	— 6.4	—13.7	— 8.0	— 23.1
Daily range	17.1	14.8	17.4	17.4	15.1	14.6	18.4	21.4	17.4	25.7
Monthly mean	26.9	29.1	29.4	27.8	32.3	29.5	25.7	23.3	24.0	20.3
April:										
Highest	73.1	76.8	76.6	75.0	77.3	71.5	74.4	71.7	73.7	73.7
Lowest	16.2	18.1	18.5	17.2	23.0	21.2	13.9	10.8	15.1	6.2
Daily range	17.9	18.1	20.7	20.5	17.5	16.9	21.2	21.3	19.4	24.5
Monthly mean	40.5	43.4	43.3	42.4	44.6	42.7	41.5	39.4	41.2	38.6
May:										
Highest	80.4	82.3	82.8	81.0	84.6	79.7	82.6	81.2	82.8	84.1
Lowest	28.3	29.0	29.3	28.9	33.1	31.8	28.0	26.6	31.0	23.9
Daily range	19.7	20.8	22.7	22.2	20.3	19.1	23.9	23.2	22.2	26.5
Monthly mean	51.2	55.0	55.4	53.8	55.1	53.7	54.0	52.3	54.9	51.8
June:										
Highest	85.5	88.2	88.6	87.1	91.7	87.5	88.8	87.2	87.8	89.5
Lowest	37.3	37.3	37.6	38.1	41.8	42.3	38.8	36.0	41.7	33.5
Daily range	20.1	21.6	23.4	23.2	21.8	20.3	24.9	24.5	21.6	27.3
Monthly mean	60.7	64.3	64.8	63.4	65.7	63.9	63.6	62.3	64.6	61.6
July:										
Highest	87.1	91.8	91.8	89.7	95.1	91.0	91.5	89.3	90.7	91.4
Lowest	43.6	43.1	43.8	44.1	48.5	48.4	43.9	42.3	47.8	40.5
Daily range	20.3	21.9	23.3	23.4	21.8	20.3	24.5	23.4	20.5	25.6
Monthly mean	66.4	68.8	68.9	67.5	71.5	68.9	67.8	66.6	68.7	65.4
August:										
Highest	86.0	89.5	90.1	88.3	92.7	88.2	89.6	87.6	87.8	87.9
Lowest	41.7	42.0	40.5	41.4	46.0	46.2	40.3	38.5	43.5	37.3
Daily range	18.3	20.8	23.4	24.1	21.4	22.2	24.2	23.1	20.3	24.2
Monthly mean	64.5	66.4	66.3	64.7	69.1	65.4	65.3	64.1	65.6	62.5
September:										
Highest	85.0	86.9	86.8	85.6	90.2	85.0	86.0	83.9	84.2	83.8
Lowest	34.2	34.1	31.9	31.6	36.5	36.5	31.5	30.5	33.4	29.2
Daily range	18.4	19.6	22.4	22.5	20.8	18.7	22.8	22.1	20.0	23.5
Monthly mean	59.2	60.9	60.7	59.2	63.0	60.4	58.3	57.6	58.1	55.6
October:										
Highest	74.5	75.6	76.0	74.3	77.5	73.2	74.2	72.6	71.2	73.3
Lowest	25.4	25.1	23.5	23.4	26.3	26.3	21.3	21.3	24.4	17.6
Daily range	16.3	16.4	20.0	19.4	19.1	16.4	19.5	18.9	17.0	19.9
Monthly mean	48.1	49.0	48.3	47.0	51.1	48.5	46.3	45.9	45.8	43.4
November:										
Highest	61.3	62.8	62.2	61.5	65.3	60.0	59.2	58.8	57.7	55.8
Lowest	14.8	13.7	13.1	11.8	17.7	15.7	6.6	7.4	7.4	0.2
Daily range	13.2	12.0	14.8	15.1	14.3	12.9	15.0	14.7	13.1	14.8
Monthly mean	37.0	37.1	36.9	35.7	39.6	37.4	33.8	33.3	33.2	29.5
December:										
Highest	49.3	48.8	52.9	49.0	53.6	48.4	45.2	44.7	42.4	44.2
Lowest	0.5	— 0.3	— 2.3	— 3.2	— 1.0	— 0.8	—13.2	—14.5	—15.2	— 24.6
Daily range	12.7	10.7	13.3	14.0	12.8	12.7	15.7	16.8	15.0	19.4
Monthly mean	27.0	26.5	26.5	25.2	29.4	27.5	21.5	21.0	17.7	14.4
Annual mean	43.5	45.1	45.2	43.8	47.4	45.1	42.4	41.1	41.4	38.3

RAIN AND SNOW.

TABLE III.—Summary of the total fall of rain and snow, and the number of days on which rain and snow fell in Ontario, during 1915, at stations reporting the whole year, and the average for the Province.

Stations	Rain.		Snow.		Stations	Rain.		Snow.	
	Inches	Days	Inches	Days		Inches	Days	Inches	Days
ALGOMA:					ONTARIO:				
Biscotasing	19.72	86	67.7	48	Uxbridge	25.14	93	55.5	21
BRANT:					OXFORD:				
Paris	21.19	81	63.8	23	Woodstock	30.73	105	70.8	40
BRUCE:					PARRY SOUND:				
North Bruce	23.90	94	49.1	47	Emsdale	26.35	97	59.3	32
Southampton	22.89	115	102.4	61	Parry Sound	23.47	106	69.5	37
Wiarton	21.38	61	60.0	20	PEEL:				
CARLETON:					Alton	29.51	80	68.3	32
Ottawa	26.84	100	85.7	42	PERTH:				
DUFFERIN:					Listowel	28.12	50	76.0	26
Grand Valley	26.33	80	53.5	28	PETERBOROUGH:				
DUNDAS:					Peterborough	24.50	76	47.2	19
Morrisburg	29.55	76	62.3	26	PRINCE EDWARD:				
ELGIN:					Bloomfield	25.37	64	39.5	12
Port Burwell	32.48	81	40.5	22	Hillier	27.00	61	42.2	13
Port Stanley	32.69	138	67.0	62	RAINY RIVER:				
ESSEX:					Ignace	21.65	68	107.9	32
Cottam	37.21	89	34.0	18	Lac Seul	17.89	52	40.3	24
Windsor	33.76	91	28.7	17	Mine Centre	35.83	72	44.3	27
FRONTENAC:					RENFREW:				
Kingston	22.95	101	29.8	29	Renfrew	19.79	84	53.1	36
Sydenham	23.99	45	33.6	11	Stonecliff	16.44	80	51.8	31
GREY:					SIMCOE:				
Markdale	22.05	63	95.5	35	Barrie	19.12	131	101.6	64
HALTON:					Collingwood	20.02	72	77.4	35
Georgetown	32.30	107	58.9	38	SUDBURY:				
HASTINGS:					Sudbury	24.31	88	21.0	19
Queensboro'	21.19	85	59.0	17	Copper Cliff	20.60	68	24.5	11
HURON:					Wawaitin Falls	23.85	95	92.1	59
Clinton	27.78	114	71.2	45	THUNDER BAY:				
Goderich	27.45	109	63.5	28	Heron Bay	22.55	62	65.3	31
Lucknow	27.61	96	86.2	66	Kakabeka Falls	26.62	91	48.0	26
KENORA:					Nipigon	26.53	116	64.4	50
Sioux Lookout	20.56	83	60.5	36	Port Arthur	22.82	114	26.1	28
KENT:					White Fish	20.87	43	33.5	31
Chatham	29.15	72	41.5	12	VICTORIA:				
Wallaceburg	22.75	79	21.1	17	Kinmount	22.40	68	70.0	35
LANARK:					Lindsay	21.35	97	49.6	36
Almonte	23.65	88	74.0	25	WATERLOO:				
MacCue	27.53	54	37.0	8	Berlin	35.73	91	69.8	33
LEEDS:					WELLAND:				
Westport	24.20	59	39.3	17	Welland	28.24	99	29.7	12
LINCOLN:					WELLINGTON:				
Grimsby	25.48	90	38.5	16	Elora	30.35	85	66.3	33
North Grimsby	23.55	94	63.3	24	Guelph	27.83	100	64.0	28
Port Dalhousie	23.98	89	28.1	33	WENTWORTH:				
MIDDLESEX:					Stoney Creek	21.38	70	38.9	14
London	33.04	111	92.9	46	YORK:				
Westminster	36.58	68	60.0	16	Agincourt	29.73	84	56.5	37
MUSKOKA:					Deer Park	22.98	79	48.0	17
Beatrice	24.68	77	103.0	31	Toronto	28.31	116	64.1	41
Buckskin	18.76	40	33.5	11	Wexford	27.62	93	59.0	20
Ronville	26.07	84	40.7	15	Average for the				
NIPISSING:					Province: 1915.	26.03	85	55.8	32
Cochrane	24.14	106	71.2	39	1914.	19.65	71	74.3	40
Haileybury	21.06	105	63.6	68	1913.	25.73	79	53.9	30
Iroquois Falls	25.24	93	97.2	71	1912.	27.09	85	78.0	40
Rutherglen	21.29	78	61.6	29	1911.	23.32	78	64.0	38
NORFOLK:					1911-1915.	24.36	80	65.3	36
Port Dover	37.79	123	60.2	47	1882-1915.	24.15	84	72.3	40

RAIN AND SNOW.

TABLE IV. Monthly summary of inches of rain and snow in precipitation in the several districts of Ontario in 1915, also the average derived from the thirty-four years, 1882–1915.

Month.	West and South-west.		North and North-west.		Centre.		East and North-east.		The Province.	
	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.
1915	in.	in.	in.	in.	in.	in.	in.	in.	in	in.
January	0.96	18.8	0.35	14.2	0.80	19.7	1.49	12.7	0.90	16.3
February	1.73	8.8	0.68	11.9	1.50	9.8	1.26	12.4	1.29	10.7
March	0.29	6.7	0.09	5.1	0.11	5.2	0.22	3.4	0.18	5.1
April	0.94	0.3	1.44	0.7	1.28	0.5	0.95	0.2	1.15	0.4
May	2.61	......	1.99	0.3	2.12	......	2.00	......	2.18	0.1
June	3.04	......	4.27	0.2	1.68	......	3.26	......	3.06	......
July	6.13	......	2.55	......	4.27	......	2.49	......	3.86	......
August	6.16	......	3.34	......	6.36	......	6.28	......	5.54	......
September	4.23	......	4.14	......	3.16	......	2.03	......	3.39	......
October	1.71	S	2.31	0.3	1.79	S	1.67	......	1.87	0.1
November	2.31	4.2	2.25	7.8	1.66	2.8	1.46	2.2	1.92	4.3
December	0.87	18.1	0.14	21.6	0.89	16.3	0.87	19.1	0.69	18.8
The Year	30.98	56.9	23.55	62.1	25.62	54.3	23.98	50.0	26.03	55.8
1882–1915										
January	1.20	15.5	0.70	24.4	1.09	17.3	0.94	20.2	0.98	19.3
February	1.17	13.2	0.47	20.1	0.91	14.7	0.63	16.3	0.79	16.1
March	1.36	8.3	0.92	12.9	1.30	9.7	1.12	10.9	1.18	10.4
April	1.96	2.2	1.54	3.6	1.93	2.7	1.59	3.1	1.75	2.9
May	3.15	......	2.64	0.3	2.80	......	2.66	0.1	2.81	0.1
June	2.84	......	2.68	S	2.62	......	2.71	......	2.71	......
July	2.68	......	2.85	......	2.85	......	2.89	......	2.82	......
August	2.83	......	2.83	......	2.39	......	2.74	......	2.70	......
September	2.57	......	3.02	......	2.36	......	2.51	......	2.61	......
October	2.66	0.7	2.95	1.5	2.46	0.5	2.36	0.8	2.61	0.9
November	2.28	5.1	1.90	12.3	2.07	5.0	1.86	7.3	2.03	7.4
December	1.45	12.3	0.84	21.9	1.26	12.0	1.08	14.4	1.16	15.2
The Year	26.15	57.3	23.34	97.0	24.04	61.9	23.09	73.1	24.15	72.3

SUNSHINE.

TABLE V. Monthly summary of bright sunshine at the principal stations in Ontario for 1915. showing the number of hours the sun was above the horizon, the hours of registered sunshine, the total for the year, and the average derived from the thirty-four years, 1882-1915,

Month.	Sun above Horizon.	Woodstock.	Toronto.	Lindsay.	Kingston.	Ottawa.	Average of five stations.		
							1915	1914	1882–1915
1915	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
January	285.7	72.8	77.8	58.5	69.5	87.1	73.1	66.0	....
February	291.4	79.6	81.3	96.8	105.6	100.3	92.7	148.8	....
March	369.9	174.6	211.6	186.1	201.5	211.3	197.0	128.9	....
April	406.4	191.3	200.4	159.1	174.5	209.4	186.9	137.6	....
May	461.1	223.4	230.2	183.1	245.6	229.5	222.4	263.0	....
June	465.7	265.5	281.6	214.8	273.9	301.2	267.4	262.1	....
July	470.9	217.2	237.8	185.8	257.0	282.6	236.1	266.0	....
August	434.5	204.4	214.4	165.1	205.5	182.4	194.4	223.7	....
September	376.3	183.9	210.2	168.8	196.2	217.2	195.3	210.8	....
October	340.2	146.8	160.9	123.6	149.6	153.6	146.9	137.5	....
November	286.9	94.2	93.0	76.4	111.2	88.2	92.6	83.9	....
December	274.3	47.0	90.5	56.7	63.2	64.2	64.3	66.1	....
The Year	4,463.3	1,900.7	2,089.7	1,674.8	2,053.3	2,127.0	1,969.1	1,994.4	....
1882–1915									
January	....	61.8	76.6	74.5	76.6	85.7	....	....	75.0
February	....	90.8	107.5	103.1	110.5	110.0	....	....	104.4
March	....	124.9	152.1	148.2	147.7	148.4	....	....	144.2
April	....	170.4	189.7	186.2	183.2	190.8	....	....	184.1
May	....	209.5	222.4	210.1	207.6	207.2	....	....	211.4
June	....	249.5	262.4	239.6	253.5	236.5	....	....	248.3
July	....	273.3	282.7	253.3	270.3	253.8	....	....	266.7
August	....	233.2	249.8	228.1	246.6	238.2	....	....	239.2
September	....	175.6	208.5	188.3	188.1	172.0	....	....	186.5
October	....	143.7	153.3	130.6	138.5	131.5	....	....	139.5
November	....	74.6	83.4	72.2	79.2	84.6	....	....	78.8
December	....	54.1	65.8	55.7	67.4	61.1	....	....	60.8
The Year	....	1,861.4	2,054.2	1,889.9	1,969.2	1,919.8	....	....	1.938.9

RURAL AREA ASSESSED.

TABLE VI.—Showing by County Municipalities the rural area of Ontario as returned by Municipal assessors for 1915; also the comparative totals for the Province for the five years, 1911-1915.

Counties and Districts.	Acres of assessed land.	Acres cleared.	Acres of woodland.	Acres of slash land.	Acres of swamp, marsh or waste land.	Per cent. cleared.
Algoma	307,993	48,001	201,754	13,556	44,682	15.59
Brant	215,906	179,910	9,392	17,084	19,520	83.33
Bruce	935,063	581,450	113,888	106,666	133,059	62.18
Carleton	559,332	365,642	50,992	96,393	46,305	65.37
Dufferin	355,986	273,710	17,378	36,734	28,164	76.88
Dundas	236,894	177,524	19,619	34,129	5,622	74.94
Durham	369,191	306,229	25,968	10,279	26,715	82.95
Elgin	435,406	360,663	46,134	23,337	5,272	82.83
Essex	425,485	356,090	25,112	35,657	8,626	83.69
Frontenac	696,685	258,589	78,937	162,021	197,138	37.12
Glengarry	288,132	194,078	53,176	19,613	21,265	67.36
Grenville	273,521	187,001	31,125	17,783	37,612	68.37
Grey	1,062,207	691,267	120,494	76,957	173,489	65.08
Haldimand	280,925	240,752	31,085	8,026	1,062	85.70
Haliburton	585,338	45,780	392,487	52,410	94,661	7.82
Halton	225,321	174,250	15,979	24,554	10,538	77.33
Hastings	1,081,227	444,224	247,387	216,510	173,106	41.09
Huron	798,333	662,450	49,377	32,310	54,196	82.98
Kenora	82,494	5,084	27,587	36,267	13,556	6.16
Kent	567,782	470,240	31,831	47,805	17,906	82.82
Lambton	659,368	496,077	64,582	85,620	13,089	75.24
Lanark	671,932	334,492	176,607	37,443	123,390	49.78
Leeds	471,341	271,263	100,206	34,572	65,300	57.55
Lennox & Addington	442,933	253,399	96,955	49,420	43,159	57.21
Lincoln	189,821	162,903	14,629	10,537	1,752	85.82
Manitoulin	287,399	48,504	58,158	87,188	93,549	16.88
Middlesex	756,601	660,926	61,935	19,311	14,429	87.35
Muskoka	561,635	70,655	307,518	82,190	101,272	12.58
Nipissing	313,704	52,717	191,335	6,178	63,474	16.80
Norfolk	396,391	279,492	56,312	33,064	27,523	70.51
Northumberland	437,622	350,923	37,641	19,162	29,896	80.19
Ontario	508,802	380,382	24,335	45,005	59,080	74.76
Oxford	472,059	399,947	34,450	19,045	18,617	84.72
Parry Sound	636,605	85,500	382,615	94,659	73,831	13.43
Peel	287,962	263,285	8,802	5,238	10,637	91.43
Perth	518,126	452,559	33,016	23,587	8,964	87.35
Peterborough	584,528	260,796	136,774	101,600	85,358	44.62
Prescott	292,443	205,127	31,398	43,070	12,848	70.14
Prince Edward	233,078	196,985	17,320	3,957	14,816	84.51
Rainy River	297,202	33,377	187,688	27,935	48,202	11.23
Renfrew	1,068,389	367,056	391,417	143,014	166,902	34.36
Russell	250,729	148,083	21,584	75,491	5,571	59.06
Simcoe	970,767	673,969	105,153	148,122	43,523	69.43
Stormont	249,542	156,780	35,754	44,066	12,942	62.83
Sudbury	397,787	52,341	228,338	24,668	92,440	13.16
Thunder Bay	428,897	32,203	179,363	163,831	43,500	7.51
Timiskaming	288,461	27,043	191,512	8,427	61,479	9.37
Victoria	595,308	288,444	62,798	107,405	136,661	48.45
Waterloo	308,098	252,653	32,152	6,703	16,590	82.00
Welland	226,115	184,972	17,657	13,374	10,112	81.80
Wellington	627,118	503,758	32,748	17,376	73,236	80.33
Wentworth	268,508	213,474	14,947	11,718	28,369	79.50
York	531,843	437,720	25,153	25,175	43,795	82.30
The Province.						
1915	25,014,335	14,620,739	4,950,554	2,686,242	2,756,800	58.45
1914	24,935,350	14,595,068	5,066,783	2,487,396	2,786,103	58.53
1913	24,914,027	14,515,128	5,010,284	2,488,879	2,899,736	58.26
1912	24,799,117	14,447,258	5,366,855	2,366,337	2,718,666	58.25
1911	24,683,747	14,381,650	5,333,296	2,307,773	2,561,028	58.26

FALL WHEAT AND SPRING WHEAT.

TABLE VII.—Showing by County Municipalities of Ontario the area, produce and market value of Fall Wheat and Spring Wheat for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual average for various periods.

Counties and Districts.	Fall Wheat.				Spring Wheat.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma..........	585	16,848	28.8	18,482	1,080	24,732	22.9	26,661
Brant..........	24,119	704,274	29.2	693,710	31	691	22.3	656
Bruce..........	32,943	853,224	25.9	835,306	4,790	95,800	20.0	86,795
Carleton..........	663	20,288	30.6	20,958	7,895	191,059	24.2	202,331
Dufferin..........	3,420	90,630	26.5	92,080	3,569	70,309	19.7	70,450
Dundas..........	320	9,536	29.8	10,490	1,449	39,848	27.5	43,315
Durham..........	10,238	331,711	32.4	329,389	6,702	138,061	20.6	133,091
Elgin..........	33,425	1,039,518	31.1	990,661	147	2,661	18.1	2,520
Essex..........	30,156	946,898	31.4	914,703	260	5,876	22.6	5,518
Frontenac..........	1,553	39,136	25.2	38,549	1,820	41,132	22.6	40,926
Glengarry..........	158	4,740	30.0	4,920	4,818	111,296	23.1	120,979
Grenville..........	121	2,868	23.7	2,971	890	20,025	22.5	20,686
Grey..........	24,490	624,495	25.5	621,373	7,438	138,347	18.6	136,964
Haldimand..........	32,117	947,452	29.5	902,922	383	7,928	20.7	7,397
Haliburton..........	64	1,472	23.0	1,546	322	6,215	19.3	6,153
Halton..........	18,656	514,906	27.6	509,757	1,269	26,015	20.5	25,078
Hastings..........	18,325	533,258	29.1	527,392	2,627	57,794	22.0	57,100
Huron..........	30,744	860,832	28.0	847,920	2,352	48,451	20.6	46,416
Kent..........	62,957	1,976,850	31.4	1,883,938	306	5,967	19.5	5,490
Lambton..........	41,654	1,307,936	31.4	1,258,234	183	3,386	18.5	3,295
Lanark..........	1,335	34,176	25.6	35,816	6,711	157,709	23.5	161,809
Leeds..........	2,122	52,626	24.8	55,152	1,551	35,208	22.7	37,884
Lennox and Add..	6,724	211,134	31.4	203,744	2,093	46,046	20.0	45,355
Lincoln..........	16,674	553,577	33.2	535,863	140	3,500	25.0	3,500
Manitoulin..........	572	13,900	24.3	13,983	1,381	28,172	20.4	27,749
Middlesex..........	50,080	1,672,672	33.4	1,592,384	141	2,326	16.5	2,259
Muskoka..........	61	1,220	20.0	1,281	451	9,020	20.0	9,435
Nipissing..........	90	2,340	26.0	2,497	1,330	31,122	23.4	30,842
Norfolk..........	31,463	987,938	31.4	948,420	90	1,494	16.6	1,419
Northumberland .	19,929	659,650	33.1	641,180	5,341	108,956	20.4	104,816
Ontario..........	14,999	460,469	30.7	438,366	7,199	159.818	22.2	147,672
Oxford..........	29,256	962,522	32.9	951,934	93	2,046	22.0	1,997
Parry Sound..........	55	1,375	25.0	1,425	1,224	25,214	20.6	25,819
Peel..........	18,165	561,290	30.9	546,135	3,465	72,419	20.9	65,322
Perth..........	27,656	829,680	30.0	829,680	513	9,234	18.0	8,708
Peterborough..........	11,154	316,744	28.4	320,575	4,738	97,129	20.5	94,895
Prescott..........	294	8,820	30.0	9,261	4,263	86,965	20.4	89,922
Prince Edward ..	7,505	231,905	30.9	226,339	1,045	25,080	24.0	24,303
Rainy R. & Kenora	44	1,241	28.2	1,230	1,583	44,007	27.8	44,139
Renfrew..........	2,189	50,128	22.9	48,474	37,738	735,891	19.5	730,740
Russell..........	317	7,925	25.0	8,718	3,476	79,600	22.9	84,456
Simcoe..........	73,024	2,227,232	30.5	2,162,642	4,596	88,243	19.2	84,537
Stormont..........	50	1,080	21.6	1,166	1,642	38,094	23.2	41,142
Sudbury..........	20	400	20.0	450	1,038	24,601	23.7	28,021
Thunder Bay..........	....	....	......	....	772	20,690	26.8	21,869
Timiskaming..........	116	3,464	29.6	3,479	967	26,786	27.7	26,036
Victoria..........	9,750	276,900	28.4	261,671	7,123	151,008	21.2	133,038
Waterloo..........	27,481	777,712	28.3	765,269	152	3,040	20.0	3,010
Welland..........	24,265	737,656	30.4	709,625	43	903	21.0	888
Wellington..........	11,405	318,200	27.9	308,018	4,008	90,180	22.5	86,483
Wentworth..........	20,681	665,928	32.2	653,941	299	5,382	18.0	5,167
York..........	37,001	1,280,235	34.6	1,239,267	8,605	194,473	22.6	177,943
The Province:								
1915..........	811,185	24,737,011	30.5	24,023,286	162,142	3,439,949	21.2	3,392,996
1914..........	685,692	14,333,548	20.9	15,641,232	118,607	2,169,425	18.3	2,340,520
1913..........	646,533	15,945,717	24.7	13,550,459	116,581	2,068,951	17.7	1,818,652
Averages (10 years)								
1902-1911....	720,272	16,912,017	23.5	14,142,444	182,335	3,269,976	17.9	2,655,591
1892-1901....	930,794	18,688,313	20.1	12,650,091	356,355	5,405,846	15.2	3,650,840
1882-1891....	902,846	18,059,235	20.0	16,250,884	563,547	8,882,998	15.8	7,959,306
Average (34 years)								
1882-1915....	836,542	17,836,817	21.3	14,630,739	339,493	5,457,906	16.1	4,478,877

BARLEY AND OATS.

TABLE VIII.—Showing by County Municipalities of Ontario the area, produce and market value of Barley and Oats for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Barley.				Oats.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	1,637	56,640	34.6	37,156	9,984	408,346	40.9	178,447
Brant	8,842	325,386	36.8	173,105	29,424	1,324,080	45.0	526,984
Bruce	21,066	794,188	37.7	422,508	118,108	4,995,968	42.3	1,878,484
Carleton	7,517	260,840	34.7	164,068	89,198	3,817,674	42.8	1,565,246
Dufferin	15,369	542,526	35.3	302,730	67,597	2,697,120	39.9	1,068,060
Dundas	5,891	230,338	39.1	155,248	32,994	1,451,736	44.0	640,216
Durham	11,088	389,189	35.1	227,286	59,442	2,389,568	40.2	898,478
Elgin	7,173	246,034	34.3	148,359	52,089	2,109,605	40.5	879,705
Essex	9,165	346,437	37.8	200,933	65,729	3,016,961	45.9	1,086,106
Frontenac	4,120	138,020	33.5	84,330	37,453	1,498,120	40.0	621,720
Glengarry	5,210	176,619	33.9	116,215	42,055	1,783,132	42.4	775,662
Grenville	1,411	43,882	31.1	29,884	37,323	1,392,148	37.3	587,486
Grey	29,627	992,505	33.5	528,013	160,569	6,583,329	41.0	2,468,748
Haldimand	8,721	300,875	34.5	170,897	40,703	1,611,839	39.6	646,347
Haliburton	860	24,940	29.0	14,490	8,839	305,829	34,6	120,497
Halton	6,523	224,391	34.4	129,922	31,765	1,200,717	37.8	507,903
Hastings	15,357	519,067	33.8	322,860	91,310	3,698,055	40.5	1,490,316
Huron	32,867	1,229,226	37.4	634,281	141,436	5,798,876	41.0	2,191,975
Kent	14,610	547,875	37.5	271,198	67,527	3,234,543	47.9	1,183,843
Lambton	16,769	650,637	38.8	339,633	82,092	3,571,002	43.5	1,278,419
Lanark	5,645	196,446	34,8	119,243	48,538	1,985,204	40.9	786,141
Leeds	4,351	149,239	34.3	97,155	46,566	1,937,146	41.6	838,784
Lennox and Add.	8,410	300,237	35.7	173,537	39,119	1,588,231	40.6	630,528
Lincoln	2,479	91,475	36.9	54,976	22,543	1,021,198	45.3	422,776
Manitoulin	1,892	65,085	34.4	40,223	6,947	308,447	44.4	124,613
Middlesex	16,809	647,147	38.5	339,752	104,789	4,422,096	42.2	1,724,617
Muskoka	907	26,394	29.1	18,265	17,240	598,228	34.7	268,006
Nipissing	1,080	33,696	31.2	23,082	13,198	512,082	38.8	209,954
Norfolk	6,048	211,075	34.9	122,424	42,714	1,687,203	39.5	703,564
Northumberland	10,049	346,691	34.5	198,307	65,401	2,511,398	38.4	971,911
Ontario	19,625	706,500	36.0	387,162	87,953	3,949,090	44.9	1,476,960
Oxford	14,553	576,299	39.6	322,727	75,981	3,479,930	45.8	1,451,131
Parry Sound	1,139	34,056	29.9	23,499	22,209	857,267	38.6	374,626
Peel	21,171	726,165	34.3	422,628	54,908	2,108,467	38.4	834,953
Perth	26,462	1,047,895	39.6	557,480	107,728	4,847,760	45.0	1,895,474
Peterborough	9,030	303,408	33.6	173,246	59,882	2,419,233	40.4	878,182
Prescott	6,431	187,785	29.2	126,943	46,473	1,752,032	37.7	756,878
Prince Edward	10,018	343,617	34.3	188,302	29,773	1,217,716	40.9	446,902
Rainy R'r. & Kenora	1,593	51,454	32.3	34,680	6,997	309,267	44.2	139,789
Renfrew	4,467	134,010	30.0	81,880	66,074	2,365,449	35.8	943,814
Russell	4,198	147,350	35.1	100,345	32,541	1,467,599	45.1	600,248
Simcoe	55,278	2,039,758	36.9	1,105,549	141,029	6,247,585	44.3	2,367,835
Stormont	3,424	123,606	36.1	83,063	28,346	1,258,562	44.4	537,406
Sudbury	1,455	40,886	28.1	29,152	11,923	401,805	33.7	188,045
Thunder Bay	1,626	48,780	30.0	30,878	7,677	383,850	50.0	177,339
Timiskaming	911	32,796	36.0	18,563	8,516	382,368	44.9	157,918
Victoria	16,163	585,101	36.2	304,253	73,196	3,103,510	42.4	1,151,402
Waterloo	9,381	372,426	39.7	217,869	58,938	2,593,272	44.0	1,112,514
Welland	1,660	50,298	30.3	29,072	25,078	917,855	36.6	392,842
Wellington	22,421	822,851	36.7	448,454	113,519	4,631,575	40.8	1,787,788
Wentworth	6,978	248,417	35.6	145,572	37,963	1,693,150	44.6	721,282
York	32,841	1,162,571	35.4	639,414	102,359	4,370,729	42.7	1,783.257
The Province:								
1915	552,318	19,893,129	36.0	11,130,811	2,871,755	120,217,952	41.9	47,452,121
1914	579,473	18,096,754	31.2	11,640,790	2,776,883	103,564,322	37.3	51,232,043
1913	623,658	18,255,958	29.3	10,136,759	2,699,459	98,426,902	36.5	36,342,489
Averages (10 yrs.)								
1902-1911	711,199	21,709,056	30.5	10,870,736	2,703,900	98,968,442	36.6	36,309,289
1892-1901	498,932	13,100,823	26.3	5,037,346	2,291,902	79,229,462	34.6	22,119,649
1882-1891	743,245	19,349,351	26.0	10,547,091	1,663,205	58,410,603	35.1	21,017,492
Average (34 yrs.)								
1882-1915	645,194	18,149,130	28.1	9,081,090	2,280,585	81,962,913	35.9	28,455,764

PEAS AND BEANS.

TABLE IX.--Showing by County Municipalities of Ontario the area, produce and market value of Peas and Beans for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Peas.				Beans.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	1,500	24,750	16.5	35,714	2	32	16.0	80
Brant	724	13,756	19.0	19,011	829	11,606	14.0	34,238
Bruce	11,293	150,197	13.3	269,904	419	5,154	12.3	13,555
Carleton	927	20,672	22.3	35,349	380	8,056	21.2	25,135
Dufferin	2,225	26,033	11.7	41,575	69	1,035	15.0	3,209
Dundas	229	4,878	21.3	6,688	226	5,108	22.6	15,528
Durham	7,821	113,405	14.5	194,716	556	8,229	14.8	22,712
Elgin	702	11,443	16.3	15,311	6,815	94,047	13.8	294,367
Essex	185	3,330	18.0	5,328	1,126	21,056	18.7	58,746
Frontenac	373	7,124	19.1	9,368	312	6,552	21.0	16,904
Glengarry	708	13,310	18.8	19,659	205	3,998	19.5	11,434
Grenville	262	5,240	20.0	6,356	247	4,940	20.0	14,820
Grey	8,117	115,261	14.2	189,604	89	1,246	14.0	3,140
Haldimand	718	11,201	15.6	14,360	387	6,269	16.2	19,246
Haliburton	508	11,176	22.0	15,982	46	920	20.0	2,300
Halton	1,126	17,903	15.9	26,407	152	2,280	15.0	7,410
Hastings	1,953	33,396	17.1	44,751	525	6,668	12.7	20,071
Huron	4,726	71,835	15.2	123,556	9,557	98,437	10.3	307,123
Kent	889	16,447	18.5	21,595	26,948	382,662	14.2	1,186,252
Lambton	1,152	23,040	20.0	30,966	1,387	26,353	19.0	78,005
Lanark	956	19,502	20.4	29,565	255	3,162	12.4	9,296
Leeds	600	11,160	18.6	14.285	254	4,394	17.3	12,962
Lennox and Add'ton	920	20,332	22.1	30,457	259	4,351	16.8	13,053
Lincoln	599	7,368	12.3	9,409	588	10,172	17.3	34,178
Manitoulin	1,601	27,537	17.2	42,407	12	180	15.0	450
Middlesex	1,100	20,900	19.0	25,895	1,520	23,104	15.2	70,698
Muskoka	731	13,743	18.8	21,508	24	360	15.0	1,080
Nipissing	1,247	22,571	18.1	36,249	5	100	20.0	300
Norfolk	1,528	23,531	15.4	31,626	1,950	29,250	15.0	87,165
Northumberland	1,971	28,185	14.3	48,901	765	11,093	14.5	33.723
Ontario	6,454	95,519	14.8	149,010	463	5,695	12.3	15,035
Oxford	684	11,286	16.5	14,130	261	3,393	13.0	10,790
Parry Sound	2,078	39,898	19.2	57,772	21	420	20.0	1,197
Peel	1,985	31,363	15.8	49,554	81	1,215	15.0	3,767
Perth	3,185	44,272	13.9	61,715	75	900	12.0	2,700
Peterborough	6,585	102,726	15.6	194,871	160	2,240	14.0	7,213
Prescott	688	13,966	20.3	25,446	261	4,254	16.3	13,102
Prince Edward	2,237	50,556	22.6	72,497	640	11,136	17.4	35,969
Rainy Riv. & Kenora	146	2,730	18.7	4,341	10	150	15.0	450
Renfrew	10,378	171,237	16.5	283,397	318	5,756	18.1	17,095
Russell	1,317	28,052	21.3	51,307	183	3,331	18.2	9,860
Simcoe	9,996	191,923	19.2	327,037	368	5,520	15.0	15.014
Stormont	110	2,200	20.0	2,750	161	3,220	20.0	9,724
Sudbury	1,120	20,160	18.0	31,248	5	75	15.0	225
Thunder Bay	408	8,160	20.0	15,586	16	240	15.0	720
Timiskaming	710	20,519	28.8	32,625	5	75	15.0	225
Victoria	5,504	103,475	18.8	174,459	88	1,232	14.0	3,450
Waterloo	1,544	23,160	15.0	34,740	79	1,264	16.0	4,348
Welland	95	1,549	16.3	1,868	3,242	43,119	13.3	169,889
Wellington	6,952	80,643	11.6	126,448	80	1,200	15.0	3,612
Wentworth	188	3,328	17.7	4,619	129	2,580	20.0	7,972
York	7,188	107,101	14.9	170,719	308	4,990	16.2	15,569
The Province:								
1915	126,943	2,043,049	16.1	3,302,641	62,863	882,819	14.0	2,745,106
1914	177,856	2,609,585	14.7	3,565,974	51,149	835,895	16.3	1,787,432
1913	177,303	3,108,263	17.5	3,127,551	66,639	1,021,243	15.3	1,738,900
Averages (10 years):								
1902-1911	389,104	7,056,642	18.1	5,275,196	50,006	854,999	17.1	1,263,012
1892-1901	769,819	14,242,404	18.5	7,613,480	51,654	875,597	17.0	818,381
1882-1891	668,962	13,908,658	20.8	8,573,501	26,201	469,393	17.9	545,087
Average (34 years):								
1882-1915	558,308	10,691,322	19.1	6.725.449	44,970	762,411	17.0	1,024.012

RYE AND BUCKWHEAT.

TABLE X.—Showing by County Municipalities of Ontario the area, produce and market value of Rye and Buckwheat for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Rye.				Buckwheat.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	140	2,730	19.5	1,889	86	2,176	25.3	1,545
Brant	4,786	85,669	17.9	66,222	2,740	55,896	20.4	40,748
Bruce	1,202	21,155	17.6	15,105	3,189	82,276	25.8	54,878
Carleton	1,931	42,289	21.9	31,421	5,037	111,318	22.1	79,481
Dufferin	5,916	113,587	19.2	89,961	6,444	129,524	20.1	91,055
Dundas	495	11,039	22.3	8,003	2,143	53,575	25.0	37,610
Durham	15,467	227,365	14.7	185,530	7,745	140,959	18.2	102,195
Elgin	2,349	43,926	18.7	35,009	3,303	61,436	18.6	43,190
Essex	1,524	35,509	23.3	26,703	704	18,304	26.0	12,740
Frontenac	3,257	70,677	21.7	56,400	2,450	61,250	25.0	43,794
Glengarry	20	400	20.0	320	1,540	43,120	28.0	30,658
Grenville	988	23,020	23.3	19,222	4,596	98,814	21.5	73,419
Grey	1,672	28,926	17.3	22.071	8,237	182,861	22.2	122,517
Haldimand	540	9,936	18.4	7.184	1,915	41,556	21.7	30,876
Haliburton	465	8,556	18.4	6,503	980	20,972	21.4	14,659
Halton	956	19,311	20.2	14,213	1,201	25,822	21.5	19,160
Hastings	11,943	223,334	18.7	170,404	9,834	236,016	24.0	169,932
Huron	597	11,522	19.3	8,757	5,398	127,933	23.7	87,378
Kent	895	20,317	22.7	13,409	672	13,642	20.3	8,813
Lambton	98	1,960	20.0	1,417	261	6,342	24.3	4,439
Lanark	1,793	30,302	16.9	23,454	4,772	97,349	20.4	66,489
Leeds	1,684	31,154	18.5	25,453	4,458	121,258	27.2	88,276
Lennox & Adding'n	4,915	84,047	20.3	66,817	4,952	100,526	22.1	73,887
Lincoln	359	7,970	22.2	6,241	307	5,864	19.1	4,240
Manitoulin	297	5,524	18.6	4,143	228	4,720	20.7	3,186
Middlesex	1,051	24,488	23.3	17,705	914	18,097	19.8	13,157
Muskoka	237	3,555	15.0	2,784	197	4,196	21.3	2,799
Nipissing	54	1,172	21.7	800	176	4,400	25,0	2,860
Norfolk	13,135	207,533	15.8	163,951	10,330	190,072	18.4	140,653
Northumberland	20,986	407,128	19.4	333,031	12,709	282,140	22.2	207,373
Ontario	8,044	132,726	16.5	104,323	9,268	220,578	23.8	159,478
Oxford	2,131	31,539	14.8	25,862	3.763	82,410	21.9	61,890
Parry Sound.....	405	6,764	16.7	5,242	118	1,805	15.3	1,397
Peel	4,662	97,436	20.9	78,631	2,734	68,077	24.9	51,807
Perth	141	2,468	17.5	1,851	2,089	52,643	25.2	36,482
Peterborough ...	7,986	144,547	18.1	113,469	5,490	118,584	21.6	79,451
Prescott	200	4,200	21.0	3,032	1,349	27,789	20.6	21,314
Prince Edward..	8,256	153,562	18,6	125,153	6,759	156,809	23.2	116,980
Rainy R'r & Kenora	33	782	23.7	626	18	450	25.0	338
Renfrew	11,891	218,794	18.4	174,160	1,939	44,597	23.0	30,504
Russell	99	1,980	20.0	1,683	1,535	46,050	30.0	33,018
Simcoe	14,770	289,492	19.6	222,330	15,687	345,114	22.0	238,129
Stormont	41	1,025	25.0	820	3.060	85,680	28.0	62,803
Sudbury	45	900	20.0	630	165	4,125	25.0	2,817
Thunder Bay ...	150	3,750	25.0	2,625	21	525	25.0	368
Timiskaming ...	....	....	.....	....	8	200	25.0	1 0
Victoria	3,049	50,309	16.5	38,185	6,359	147,529	23.2	103,418
Waterloo	3,193	66,095	20.7	52,744	2,421	46,967	19.4	34,521
Welland	447	10,013	22.4	7,009	2,275	42,088	18.5	30,514
Wellington	2,046	48,081	23.5	36,493	9,077	167.925	18.5	118,219
Wentworth	1,984	42,259	21.3	32,413	1,752	41,873	23.9	30,651
York	4,411	99,689	22.6	80,648	10,092	234,134	23.2	171,152
The Province:								
1915	173,736	3,210,512	18.5	2,532.051	193,497	4,278,366	22.1	3,057,398
1914	138,913	2,315,532	16.7	1,965,522	177,227	4,251,421	24.0	3,041,564
1913	118,429	1,979,775	16.7	1,310,306	228,279	4,012,418	17.6	2,549,398
Averages (10 years)								
1902-1911 ...	112,424	1,877,432	16.7	1,129,754	131,168	2,871,668	21.9	1,503,428
1892-1901 ...	129,188	2,088,786	16.2	937,885	131,005	2,450,389	18.7	949,189
1882-1891 ...	103,636	1,683,211	16.2	1,010,057	69,230	1,413,900	20.4	586,472
Average (34 yrs.)								
1882-1915 ...	117,338	1,936,464	16.5	1,113,884	121,145	2,509,311	20,7	1,234,977

CORN.*

Table XI.—Showing by County Municipalities of Ontario, the area, produce and market value of Corn for husking and for fodder for the year 1915, together with the comparative totals for the Province for 1913 and 1914 and the annual averages for various periods.

Counties and Districts.	Corn for husking.				Corn for Silo.			
	Acres.	Bushels.	Per acre.	Market Value.	Acres.	Tons green.	Per acre.	Market value.
				$				$
Algoma	97	3,880	40.0	2,045	174	2,088	12.00	5,220
Brant	3,841	272,711	71.0	142,901	7,658	88,067	11.50	220,167
Bruce	722	32.490	45.0	15,985	12,957	133,198	10.28	332,995
Carleton	1,135	60,496	53.3	33,273	17,375	202,071	11.63	505,178
Dufferin	187	7,480	40.0	3,890	2,624	23,616	9.00	59,040
Dundas	2,687	163,370	60.8	87,893	12,162	158,106	13.00	395,265
Durham	1.204	68,748	57.1	33,824	10,016	114,383	11.42	285,957
Elgin	21,805	1,659,361	76.1	816.406	14,689	139,252	9.48	348,130
Essex	86,757	5,838.746	67.3	2,393,886	3,426	29,121	8.50	72,802
Frontenac	2.472	170,568	69.0	95,859	6,547	85,111	13.00	212,777
Glengarry	946	37.840	40.0	19,336	7,850	87,371	11.13	218,428
Grenville	2,601	182,070	70.0	96,497	7,083	77,913	11.00	194,782
Grey	562	22.480	40.0	11,352	16,603	175,826	10.59	439,565
Haldimand	2,918	209.804	71.9	104,273	4,588	51,569	11.24	128,922
Haliburton	281	16.860	60.0	10,116	377	2,828	7.50	7,070
Halton	315	18,522	58.8	10,002	5,562	61,182	11.00	152,955
Hastings	6.078	395.070	65.0	237,042	14,899	127,088	8.53	317,720
Huron	1.632	79,642	48.8	40.777	16,503	180,708	10.95	451,770
Kent	67,336	5.023,266	74.6	1,984,190	7,484	70,200	9.38	175,500
Lambton	25,322	1,955.326	77.1	915,641	16,215	155,502	9.59	388,755
Lanark	1,393	83.580	60.0	41,790	11,615	136,012	11.71	340,030
Leeds	3,848	278.980	72.5	148,696	10,576	145,420	13.75	363,550
Lennox & Addingt'n.	2,991	200,995	67.2	100,096	5,309	55,373	10.43	138,432
Lincoln	4.795	380.802	79.4	221,627	3,506	33,132	9.45	82,830
Manitoulin	69	2.760	40.0	1,380	728	6,712	9.22	16,780
Middlesex	14.576	982,422	67.4	483,352	23,458	258,742	11.03	646,855
Muskoka	208	12.230	58.8	6.115	598	5,502	9.20	13,755
Nipissing	126	6,300	50.0	3,150	223	1,695	7.60	4,238
Norfolk	15,962	1.123,725	70.4	548,378	9,024	75,080	8.32	187,700
Northumberland	5.112	341.993	66.9	170,313	10,723	100,046	9.33	250,115
Ontario	1,152	58,982	51.2	32.440	16,749	192,279	11.48	480,698
Oxford	5,405	362,676	67.1	191,856	30,303	359,394	11.86	898,485
Parry Sound	70	4,200	60.0	2,520	324	3,285	10.14	8,212
Peel	378	18,900	50.0	10,206	6,069	58,809	9.68	147,023
Perth	541	27,050	50.0	14,174	15,207	157,240	10.34	393,100
Peterborough	323	19,380	60.0	10,465	8,137	92,355	11.35	230,887
Prescott	1,208	54,360	45.0	31,529	5,534	59,214	10.70	148,035
Prince Edward	7,022	492,242	70.1	242,675	6,661	66,943	10.05	167.358
Rainy R'r & Kenora	25	1,000	40.0	500	76	760	10.00	1,900
Renfrew	543	31,820	58.6	16,642	6,461	78,113	12.09	195,283
Russell	606	36.360	60.0	19,234	5,633	60,836	10.80	152,090
Simcoe	1,573	97,526	62.0	55,395	16,496	189,044	11.46	472,610
Stormont	1.480	88,800	60.0	48,485	7,206	100,884	14.00	252,210
Sudbury	9	450	50.0	225	220	1,760	8.00	4,400
Thunder Bay	16	640	40.0	320	118	590	5.00	1,475
Timiskaming	....	....	....	....	5	40	8.00	100
Victoria	332	19,920	60.0	11,155	8,867	101,971	11.50	254,928
Waterloo	608	40,250	66.2	21,131	10,549	120,153	11.39	300,382
Welland	7.878	585,335	74.3	296,180	4,081	39,463	9.67	98,658
Wellington	243	9,720	40.0	4,938	10,174	112,524	11.06	281,310
Wentworth	1,368	107,388	78.5	56,808	7,998	93,977	11.75	234,943
York	1,014	70,980	70.0	38,329	16,316	201,829	12.37	504,573
The Province:								
1915	309,773	21,760.496	70.2	9,885,292	443,736	4,874,377	10.98	12,185,943
1914	290,817	23.232,360	80.0	10,622,455	418,105	4,751,223	11.36	11,878,058
1913	299,871	22,214.014	74.1	9,545,538	388,138	4,059,345	10.46	10,148,363
Averages (10 yrs.)								
1902-1911	325,515	22,988.755	70.6	8,780,681	236,330	2,731,936	11.56	5.652,083
1892-1901	294,076	21,218.057	72.2	5,314,705	157,611	1,777,533	11.28	3,555,065
Average (24 yrs.)								
1892-1915	308,234	22,135,186	71.8	7.465,405	231,974	2,614,551	11.27	5,675,327

The combined average of corn for the ten years 1882-1891 is 195,878 acres, the average value of the produce for the same period being $3,704,614. The combined average for corn for the thirty-four years 1882-1915 is 438,934 acres, the average value of the produce for the same period being $10,365.402.

POTATOES AND CARROTS.

TABLE XII.—Showing by County Municipalities of Ontario, the area, produce and market value of Potatoes and Carrots for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for the various periods.

Counties and Districts.	Potatoes				Carrots.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	1,437	204,054	142	170,181	23	6,900	300	862
Brant	2,906	127,864	44	132,084	18	5,400	300	675
Bruce	4,405	383,235	87	287,043	80	20,720	259	2,590
Carleton	5,594	699,250	125	572,686	113	34,126	302	4,266
Dufferin	4,001	172,043	43	128,688	31	6,200	200	775
Dundas	1,976	262,808	133	183,966	42	12,390	295	1,549
Durham	3,990	235,410	59	213,988	19	4,522	238	565
Elgin	3,170	104,610	33	100,949	31	7,750	250	969
Essex	3,696	273,504	74	232,478	86	25,284	294	3,160
Frontenac	3,507	371,742	106	349,809	43	13,545	315	1,693
Glengarry	2,028	255,528	126	191,646	72	14,400	200	1,800
Grenville	2,742	285,168	104	231,842	62	18.600	300	2,325
Grey	6,213	528,105	85	394,494	74	17,834	241	2,229
Haldimand	1,571	113,112	72	105,081	16	5,200	325	650
Haliburton	589	69,502	118	39,408	17	3,400	200	425
Halton	2,001	60,030	30	59,910	12	3,600	300	450
Hastings	6,028	488,268	81	424,793	80	22,000	275	2,750
Huron	4,371	205,437	47	179,963	68	24,344	358	3,043
Kent	4,722	273,876	58	257,443	44	12,100	275	1,512
Lambton	3,723	223,380	60	205,286	68	16,320	240	2,040
Lanark	2,437	263.196	108	204,240	34	10,200	300	1,275
Leeds	2,896	327,248	113	262,126	55	16,500	300	2,062
Lennox & Addingt'n.	3,353	308,476	92	271,459	41	12,300	300	1,538
Lincoln	2,397	143,820	60	139,074	94	33,464	356	4,183
Manitoulin	616	107,800	175	67,052	18	7,200	400	900
Middlesex	7,847	298.186	38	302,062	24	4,800	200	600
Muskoka	1,255	163,150	130	119,263	59	14,160	240	1,770
Nipissing	1,152	206,208	179	131,354	31	6,200	200	775
Norfolk	4,097	159,783	39	146,042	62	21,700	350	2,712
Northumberland	4,589	224.861	49	214,517	54	11,880	220	1,485
Ontario	5,590	430,430	77	348,648	36	7,200	200	900
Oxford	3,263	120,731	37	118,558	34	8,500	250	1,062
Parry Sound	1,488	224,688	151	150,766	51	13,260	260	1,658
Peel	3,855	146,490	38	130,523	102	25,500	250	3,188
Perth	3,207	157,143	49	141,429	19	5,377	283	672
Peterborough	2,590	202,020	78	193,939	18	5,400	300	675
Prescott	2,305	276,600	120	193,620	34	9,554	281	1,194
Prince Edward	2,060	166,860	81	149,673	45	15,210	338	1,901
Rainy R'r & Kenora	963	93,411	97	67,910	22	5,368	244	671
Renfrew	3,936	602,208	153	395,651	62	18,600	300	2,325
Russell	1,773	258.858	146	193,108	70	21,000	300	2.625
Simcoe	10,024	882,112	88	621,007	86	27.606	321	3,451
Stormont	1,985	277,900	140	207,591	32	8,736	273	1,092
Sudbury	1,610	223,790	139	166,276	74	22,200	300	2,775
Thunder Bay	1,886	173,512	92	107,751	56	11,200	200	1,400
Timiskaming	620	106,640	172	66,757	8	1,920	240	240
Victoria	2,437	248,574	102	186,928	17	3,400	200	425
Waterloo	3,445	155,025	45	143,088	15	5,100	340	638
Welland	3,155	113,580	36	108,810	25	7,500	300	938
Wellington	5,485	213,915	39	211,990	53	15,900	300	1,988
Wentworth	4,631	203,764	44	186,852	35	11,130	318	1,391
York	8,317	449,118	54	395,224	74	23,532	318	2,942
The Province:								
1915	173,934	13,267,023	76	10,805,026	2,439	686,232	281	85,779
1914	167,591	26,717,587	159	11,747,332	2,448	766,170	313	95,771
1913	159,661	19,024,115	119	12,114,656	2,400	592,016	247	74,002
Averages (10 yrs.)								
1902-1911	153,092	17,355,152	113	8,928,246	5,243	1,688,002	322	211,000
1892-1901	164,451	18.304,638	111	6,150,629	11,163	3,880,538	348	485.068
1882-1891	155,449	18.840,683	121	8,476.165	10,243	3,659,347	351	457.417
Average (34 yrs.)								
1882-1915	158,529	18.392,937	116	8,347.691	8.186	2,796,191	342	349,524

MANGEL-WURZELS AND TURNIPS.

TABLE XIII. Showing by County Municipalities of Ontario the area, produce and market value of Mangel-Wurzels and Turnips for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Mangel-Wurzels.				Turnips.			
	Acres.	Bushels.	Per Acre.	Market Value.	Acres.	Bushels.	Per Acre.	Market value.
				$				$
Algoma	44	19,800	450	1,584	451	216,931	481	21,693
Brant	1,218	646,758	531	51,741	3,017	1,526,602	506	152,660
Bruce	3,225	1,660,875	515	132,870	3,110	1,570,550	505	157,055
Carleton	350	149,450	427	11,956	2,058	878,766	427	87,877
Dufferin	465	173,910	374	13,913	2,850	1,348,050	473	134,805
Dundas	110	58,630	533	4,690	108	44,604	413	4,460
Durham	1,585	832,125	525	66,570	4,147	2,148,146	518	214,815
Elgin	417	163,047	391	13,044	184	65,504	356	6,550
Essex	514	240,038	467	19,203	152	48,488	319	4,849
Frontenac	184	78,016	424	6,241	588	265,776	452	26,578
Glengarry	154	56,826	369	4,546	620	249,860	403	24,986
Grenville	155	81,375	525	6,510	321	119,091	371	11,909
Grey	2,286	1,120,140	490	89,611	4,626	2,313,000	500	231,300
Haldimand	320	172,800	540	13,824	69	27,945	405	2,795
Haliburton	25	7,500	300	600	297	108,999	367	10,900
Halton	1,246	631,722	507	50,538	1,187	519,906	438	51,991
Hastings	376	178,224	474	14,258	2,068	905,784	438	90,578
Huron	4,813	2,531,638	526	202,531	3,693	1,831,728	496	183,173
Kent	718	331,716	462	26,537	64	20,032	313	2,003
Lambton	976	463,600	475	37,088	157	42,861	273	4,286
Lanark	286	124,410	435	9,953	1,086	586,440	540	58,644
Leeds	238	110,432	464	8,835	732	325,740	445	32,574
Lennox & Addingt'n	138	52,164	378	4,173	215	95,460	444	9,546
Lincoln	319	182,787	573	14,623	113	54,240	480	5,424
Manitoulin	80	41,040	513	3,283	304	156,864	516	15,686
Middlesex	1,442	608,524	422	48,682	1,832	802,416	438	80,242
Muskoka	49	19,894	406	1,592	562	255,148	454	25,515
Nipissing	28	8,596	307	688	451	149,732	332	14,973
Norfolk	377	166,634	442	13,331	852	418,332	491	41,833
Northumberland	917	379,638	414	30,371	4,513	2,089,519	463	208,952
Ontario	2,834	1,516,190	535	121,295	8,636	3,972,560	460	397,256
Oxford	2,249	1,093,014	486	87,441	5,244	2,821,272	538	282,127
Parry Sound	52	26,416	508	2,113	1,119	510,264	456	51,026
Peel	1,325	569,750	430	45,580	1,514	529,900	350	52,990
Perth	4,137	2,051,952	496	164,156	3,313	1,514,041	457	151,404
Peterborough	783	389,934	498	31,195	2,759	1,740,929	631	174,093
Prescott	152	70,680	465	5,654	520	248,560	478	24,856
Prince Edward	104	56,056	539	4,484	69	32,499	471	3,250
Rainy R'r & Kenora	52	16,900	325	1,352	147	53,067	361	5,307
Renfrew	184	65,504	356	5,240	936	379,080	405	37,908
Russell	85	38,250	450	3,060	500	250,000	500	25,000
Simcoe	2,909	1,544,679	531	123,574	6,577	3,591,042	546	359,104
Stormont	110	42,680	388	3,414	169	68,614	406	6,861
Sudbury	59	21,358	362	1,709	488	249,856	512	24,986
Thunder Bay	50	10,000	200	800	418	143,374	343	14,337
Timiskaming	27	10,584	392	847	253	88,044	348	8,804
Victoria	808	424,200	525	33,936	3,724	1,876,896	504	187,690
Waterloo	2,922	1,446,390	495	115,711	3,603	1,733,043	481	173,304
Welland	171	75,753	443	6,060	92	27,600	300	2,760
Wellington	3,278	1,560,328	476	124,826	9,699	4,102,677	423	410,268
Wentworth	1,203	700,146	582	56,012	2,365	1,229,800	520	122,980
York	4,250	2,333,250	549	186,660	4,879	2,249,219	461	224,922
The Province:								
1915	50,799	25,356,323	498	2,028,505	97,451	46,598,851	478	4,659,885
1914	50,663	25,439,520	502	2,035,162	95,371	46,336,708	486	4,633,671
1913	54,568	21,935,847	402	1,754,868	97,572	41,889,894	429	4,188,989
Averages (10 years)								
1902-1911	70,809	33,245,680	470	2,659,654	123,855	54,987,697	444	5,498,770
1892-1901	39,984	17,864,726	447	1,429,178	147,080	63,424,431	431	6,342,443
1882-1891	19,546	8,538,096	437	683,048	104,943	42,981,280	410	4,298,128
Average (34 years)								
1882-1915	44,692	20,496,701	459	1,639,736	122,079	52,891,797	433	5,289,180

SUGAR BEETS—MIXED GRAINS.

TABLE XIV.—Showing by County Municipalities of Ontario the area, produce and market value of Sugar Beets and Mixed Grains for the year 1915, together with the comparative totals for the Province for the past eight years, and the annual average for 1907-1915.

Counties and Districts.	Sugar Beets.				Mixed Grains.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	8	2,400	300	300	1,080	46,656	43.2	29,393
Brant	444	202,464	456	25,308	5,846	256,055	43.8	138,270
Bruce	226	74,354	329	9,294	18,734	807,435	43.1	452,971
Carleton	224	88,256	394	11,032	11,430	424,053	37.1	231,533
Dufferin	275	90,750	330	11,344	11,425	420,440	36.8	227,458
Dundas	110	42,130	383	5,266	11,517	522,872	45.4	276,599
Durham	89	31,150	350	3,894	21,908	830,313	37.9	454,181
Elgin	228	73,644	323	9,205	9,290	331,653	35.7	165,495
Essex	541	157,972	292	19,746	4,523	168,256	37.2	87,325
Frontenac	150	51,300	342	6,412	5,807	220,666	38.0	137,034
Glengarry	79	18,960	240	2,370	2,816	107,008	38.0	60,674
Grenville	72	33,336	463	4,167	4,926	197,040	40.0	98,520
Grey	415	178,865	431	22,358	20,995	883,890	42.1	459,623
Haldimand	86	37,238	433	4,655	5,040	196,560	39.0	109,877
Haliburton	15	3,000	200	375	570	17,100	30.0	10,260
Halton	134	45,560	340	5,695	7,092	274,460	38.7	155,619
Hastings	153	45,288	296	5,661	5,439	191,453	35.2	121,764
Huron	585	207,090	354	25,886	21,677	903,931	41.7	471,852
Kent	8,680	3,211,600	370	401,450	6,650	307,895	46.3	145,019
Lambton	2.436	840,420	345	105,052	8,573	358,351	41.8	184,192
Lanark	130	50,440	388	6,305	7,798	312,700	40.0	189,496
Leeds	263	102,044	388	12,755	5,845	215,681	36.9	120,350
Lennox and Add.	118	38,940	330	4,868	8,250	345,675	41.9	187,702
Lincoln	284	121,836	429	15,230	2,285	105,339	46.1	58,674
Manitoulin	37	14,800	400	1,850	1,766	76,821	43.5	50,548
Middlesex	451	169,125	375	21,140	12,890	524,623	40.7	262,312
Muskoka	30	8,640	288	1,080	926	35,003	37.8	18,377
Nipissing	21	4,200	200	525	747	24,053	32.2	16,669
Norfolk	209	64,999	311	8,125	5,632	203,878	36.2	114,172
Northumberland	135	43,200	320	5,400	10,829	385,512	35.6	221,284
Ontario	404	121,200	300	15,150	25,610	1,101,230	43.0	649,726
Oxford	696	302,760	435	37,845	21,618	1,016,046	47.0	531,392
Parry Sound	40	8,000	200	1,000	1,006	36,618	36.4	25,633
Peel	235	94,000	400	11,750	6,670	234,784	35.2	144,157
Perth	659	287,983	437	35,998	19,082	818,618	42.9	394,574
Peterborough	....	....	.....	....	3,628	136,413	37.6	77,483
Prescott	37	14,356	388	1,795	2,899	92,768	32.0	58,722
Prince Edward	67	26,666	398	3,333	3,881	139,716	36.0	75,866
Rainy R. & Kenora	32	8,640	270	1,080	188	8,366	44.5	5,580
Renfrew	107	42,265	395	5,283	4,314	141,499	32.8	87,729
Russell	30	10,860	362	1,358	3,247	135,075	41.6	73,616
Simcoe	651	285,138	438	35,642	21.994	923,748	42.0	570,876
Stormont	94	23,500	250	2,938	5,210	220,904	42.4	125,253
Sudbury	25	7,500	300	938	570	17,100	30.0	11,337
Thunder Bay	23	4,600	200	575	617	30,850	50.0	18,510
Timiskaming	4	1,200	300	150	297	13,365	45.0	9,195
Victoria	98	39,200	400	4,900	12,348	521,086	42.2	283,471
Waterloo	1,741	746,889	429	93,361	23,793	1,025,478	43.1	549,656
Welland	102	37,536	368	4,692	2,989	102,822	34.4	61,385
Wellington	510	208,590	409	26,074	44,080	1,842,544	41.8	939,697
Wentworth	263	124,925	475	15,616	8,946	387,362	43.3	221,571
York	444	194,472	438	24,309	20,445	819,845	40.1	429,599
The Province:								
1915	22,890	8,644.281	378	1,080,535	475,738	19,461,609	40.9	10,602,271
1914	18,534	7,466,819	403	933,352	456,631	16,854,550	36.9	10,074,687
1913	19.083	6,389,177	335	798,647	414,517	15,113,480	36.5	7,953,111
1912	21,054	7,819,066	371	977,383	448,402	16,382,161	36.5	8,674,724
1911	24,664	8,941,659	363	1,117,707	486,112	14,845,595	30.5	9,104,141
1910	26,879	11,238,577	418	1,348,629	497,936	18,261,803	36.7	9,187,822
1909	19,812	7,001,565	353	840,188	474,530	16,199,434	34.1	8,825,196
1908	17,453	7,004,748	401	840,570	456,049	15,354,350	33.7	8.444,893
Average (9 years) 1907-1915	20,802	8,082.548	389	991.717	461,446	16,297.277	35.3	8,964,247

HAY AND CLOVER—ALL FIELD CROPS.

TABLE XV.—Showing by County Municipalities of Ontario the area, produce, and market value of Hay and Clover, and all field crops enumerated in Tables VII and XV for the year 1915, together with the comparative totals for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Hay and Clover.				All Field Crops.			
	Acres.	Tons.	Per acre.	Market value.	Acres.	Value.	Per acre.	
				$		$	$	c.
Algoma	20,240	35,736	1.77	475,646	38,568	1,006,898	26	11
Brant	39,252	54,940	1.40	737,295	135,695	3,155,775	23	26
Bruce	127,692	145,589	1.14	1,961,084	364,161	6,928,422	19	03
Carleton	90,593	112,705	1.24	1,941,907	242,420	5,523,697	22	79
Dufferin	62,909	101,566	1.61	1,138,555	189,376	3,477,588	18	36
Dundas	50,244	66,549	1.32	1,021,527	122,703	2,898,313	23	62
Durham	50,262	46,957	93	809,069	212,279	4,176,260	19	67
Elgin	73,122	117,308	1.60	1,483,946	228,939	5,353,816	23	39
Essex	60,855	89,964	1.48	1,148,840	269,399	6,293,066	23	36
Frontenac	78,795	94,973	1.21	1,656,329	149,431	3,404,723	22	78
Glengarry	57,800	81,578	1.41	1,347,669	127,079	2,951,302	23	22
Grenville	46,936	46,135	98	784,295	110,736	2,185,691	19	74
Grey	153,123	206,552	1.35	2,542,655	445,136	8,285,617	18	61
Haldimand	73,304	115,181	1.57	1,414,423	173,396	3,683,729	21	24
Haliburton	10,528	10,059	96	167,784	24,783	429,068	17	31
Halton	42,674	61,424	1.44	952,072	121,871	2,679,082	21	98
Hastings	82,596	109,344	1.32	1,824,951	269,591	5,842,343	21	67
Huron	139,392	166,284	1.19	2,076,887	420,411	7,883,288	18	75
Kent	74,731	126,275	1.69	1,440,798	345,233	9,008,990	26	10
Lambton	105,363	143,889	1.27	1,567,840	306,429	6,404,588	20	90
Lanark	73,620	71,728	97	1,304,015	168,404	3,387,561	20	12
Leeds	64,824	64,669	1.00	1,131,708	150,863	3,252,607	21	56
Lennox & Addington	67,149	63,900	95	996,840	154,956	2,952,032	19	05
Lincoln	47,309	70,050	1.48	1,068,263	104,792	2,681,111	25	59
Manitoulin	17,498	22,964	1.31	276,946	34,046	691,179	20	30
Middlesex	118,685	158,323	1.33	2,235,521	357,609	7,867,233	22	00
Muskoka	25,680	37,757	1.47	602,602	49,215	1,115,227	22	66
Nipissing	18,995	24,133	1.27	398,677	38,954	877,633	22	53
Norfolk	55,662	80,450	1.45	1,000,798	199,135	4,262,315	21	40
Northumberland	57,593	62,877	1.09	1,087,143	231,616	4,728,822	20	42
Ontario	63,385	69,562	1.10	1,135,252	278,401	6,059,371	21	76
Oxford	83,053	127,445	1.53	1,753,643	278,587	6,742,870	24	20
Parry Sound	28,991	37,123	1.28	597,680	60.390	1,331,585	22	05
Peel	55,926	83,593	1.49	1,271,450	183,245	3,869,664	21	12
Perth	97,081	135,561	1.40	1.808,384	311,095	6,497,981	20	89
Peterborough	44,786	47,961	1.07	851,787	168,049	3,432,426	20	43
Prescott	75.658	89,486	1.18	1,444,304	148.306	2,955,607	19	93
Prince Edward	43.428	53,715	1.24	830,971	129,570	2,715,956	20	96
Rainy River & Kenora	15.602	21,898	1.40	295,623	27,531	605,516	21	99
Renfrew	89,557	100,107	1.12	1,768,891	241,094	4,825,016	20	01
Russell	48,930	66,243	1.35	1,049,952	104,540	2,409,678	23	05
Simcoe	106,545	137,921	1.29	1.999,855	481,603	10,764,587	22	35
Stormont	44,373	62,908	1.42	987,656	97.493	2.374,374	24	36
Sudbury	21,120	31,665	1.50	470.542	39,946	963,776	24	13
Thunder Bay	9,876	9,892	1.00	152,337	23,730	546,890	23	04
Timiskaming	7,993	11,113	1.39	183,031	20,440	508,110	24	86
Victoria	47,523	52,422	1.10	819,356	197,386	3,952,665	20	03
Waterloo	52,149	79,986	1.53	1,166,196	202,014	4,788,482	23	70
Welland	55.199	77,911	1.41	1,103,220	130,797	3,024,410	23	10
Wellington	116,651	177,180	1.52	2,367,125	359,681	7,283,731	20	25
Wentworth	51,914	76,534	1.47	1,193,930	148,697	3,691.720	24	83
York	84,586	113,678	1.34	1,857,499	343,130	7,942,026	23	15
The Province:								
1915	3,231.752	4,253,763	1.32	61,704,769	9,762,951	210,674,415	21	58
1914	3,415.484	3,842,554	1.13	55,917,380	9,621,444	199,152.945	20	70
1913	3,428,846	3,924,563	1.14	51,302,565	9,541,537	168,455,253	17	65
Averages (10 years)								
1902-1911	3,072,288	4,722,662	1.54	47,093,908	9,233,879	156,824,689	16	98
1892-1901	2.520.783	3,650,840	1.45	29,085,813	8,494,796	106,139,762	12	49
1882-1891	2,290,495	3.102,733	1.35	32,086,445	7,517,606	116,195,708	15	48
Average (33 years)								
1882-1915	2.714.092	3,882,468	1.43	38,618.700	8,557,741	133,990,428	15	66

SUMMER FALLOW, PASTURE, ORCHARD, SMALL FRUITS, VINEYARD AND GARDEN.

TABLE XVI.—Showing by County Municipalities of Ontario the area of Summer Fallow, Pasture, Orchard, Small Fruits, Vineyard and Garden for the year 1915.

Counties and Districts.	Summer fallow.	Pasture.	Orchard	Small Fruits.	Vine-yard.	Garden.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Algoma	405	7,542	427	89	....	466
Brant	2,578	27,328	4,247	495	17	864
Bruce	18,186	146,722	8,603	402	70	1,577
Carleton	1,949	107,934	2,219	178	22	1,270
Dufferin	5,022	56,442	2,290	99	13	601
Dundas	583	44,529	2,557	140	16	747
Durham	5,031	58,901	10,889	342	31	999
Elgin	6,331	90,904	9,275	761	62	1,797
Essex	1,389	51,277	7,558	1,218	289	2,799
Frontenac	1,240	89,532	2,335	170	20	1,094
Glengarry	440	49,346	1,636	67	13	559
Grenville	30	64,070	1,949	113	13	654
Grey	10,211	164,558	11,897	299	111	1,699
Haldimand	10,710	35,195	5,140	384	56	904
Haliburton	423	14,982	210	18	....	239
Halton	3,347	26,579	7,373	1,579	99	922
Hastings	3,543	124,393	10,188	577	56	1,926
Huron	8,272	178,983	13,145	430	45	1,510
Kent	1,277	87,275	8,341	861	85	2,250
Lambton	3,944	142,684	13,700	633	71	1,874
Lanark	1,738	118,043	1,652	92	12	790
Leeds	533	97,619	2,124	164	20	939
Lennox and Addington	3,557	72,473	4,352	385	32	1,229
Lincoln	3,655	19,365	16,601	2,784	5,090	1,433
Manitoulin	110	9,695	334	30	....	235
Middlesex	7,531	241,276	12,732	739	54	2,536
Muskoka	187	15,544	294	55	2	637
Nipissing	549	10,008	54	26	7	367
Norfolk	8,719	39,564	9,354	1,943	52	1,684
Northumberland	5,440	64,796	19,648	598	37	1,462
Ontario	3,794	67,689	7,677	426	47	1,397
Oxford	3,085	86,793	8,755	533	54	1,667
Parry Sound	935	20,689	210	27	....	571
Peel	6,902	54,488	5,600	773	84	893
Perth	10,063	99,793	6,170	325	49	1,160
Peterborough	3,964	63,364	2,747	198	10	1,018
Prescott	441	50,809	1,139	173	58	1,011
Prince Edward	1,197	42,239	10,801	658	29	855
Rainy River and Kenora	449	5,786	13	8	....	396
Renfrew	4,058	92,630	1,147	149	25	1,461
Russell	99	34,992	519	83	....	508
Simcoe	30,149	113,830	9,873	538	98	2,308
Stormont	432	45,613	1,787	53	....	495
Sudbury	760	9,058	17	19	5	389
Thunder Bay	770	4,633	11	37	....	294
Timiskaming	331	4,464	26	8	....	207
Victoria	2,771	59,109	2,937	85	21	912
Waterloo	5,840	31,140	4,462	239	20	647
Welland	8,415	26,759	7,745	911	931	1,199
Wellington	8,256	93,139	5,933	261	59	1,277
Wentworth	5,128	30,267	11,130	1,677	2,359	1,398
York	11,448	55,577	9,002	591	32	1,648
The Province:						
1915	226,217	3,350,420	288,825	23,443	10,276	57,774
1914	268,714	3,302,503	298,627	23,863	10,850	58,167
1913	268,487	3,120,146	306,764	24,360	11,136	55,029
1912	278,317	3,082,671	310,096	24,699	11,634	56,716
1911	279,220	3,116,768	303,188	25,360	11,586	58,748
1910	254,038	3,159,712	298,347	24,384	11,390	57,982
1909	231,707	3,180,780	300,364	24,614	11,420	57,123

RATIOS OF AREAS UNDER CROP.

TABLE XVII.—Showing by County Municipalities of Ontario the number of acres under the various crops in 1915 per 1,000 acres of cleared land; together with the comparative average for the Province for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Fall Wheat.	Spring Wheat.	Barley.	Oats.	Peas.	Beans.	Rye.	Buck-wheat.	Corn.	Potatoes.	*Other roots.	Hay and Clover.	Mixed Grains.
Algoma	12.2	22.5	34.1	208.0	31.2	0.0	2.9	1.8	5.6	29.9	11.0	421.7	22.5
Brant	134.1	0.2	49.1	163.5	4.0	4.6	26.6	15.2	63.9	16.2	26.1	218.2	32.5
Bruce	56.7	8.2	36.2	203.1	19.4	0.7	2.1	5.5	23.5	7.6	11.4	219.6	32.2
Carleton	1.8	21.6	20.6	243.9	2.5	1.0	5.3	13.8	50.6	15.3	7.5	247.8	31.3
Dufferin	12.5	13.0	56.2	247.0	8.1	0.3	21.6	23.6	10.3	14.6	13.2	229.8	41.7
Dundas	1.8	8.2	33.2	185.8	1.3	1,3	2.8	12.1	83.6	11.1	2.1	283.0	64.9
Durham	33.4	21.9	36.2	194.1	25.5	1.8	50.5	25.3	36.6	13.0	19.0	164.1	71.6
Elgin	92.7	0.4	19.9	144.4	1.9	18.9	6.5	9.2	101.2	8.8	2.4	202.7	25.8
Essex	84.7	0.7	25.7	184.6	0.5	3.1	4.3	2.0	253.3	10.4	3.6	170.9	12.7
Frontenac	6.0	7.0	15.9	144.8	1.4	1.2	12.6	9.5	34.9	13.6	3.7	304.7	22.5
Glengarry	0.8	24.8	26.9	216.7	3.6	1.1	0.1	7.9	45.3	10.5	4.8	297.8	14.5
Grenville	0.6	4.8	7.5	199.6	1.4	1.3	5.3	24.6	51.8	14.7	3.3	251.0	26.3
Grey	35.4	10.8	42.9	232.3	11.7	0.1	2.4	11.9	24.8	9.0	10.7	221.5	30.4
Haldimand	133.4	1.6	36.2	169.1	3.0	1.6	2.2	8.0	31.2	6.5	2.0	304.5	20.9
Haliburton	1.4	7.0	18.8	193.0	11.1	1.0	10.1	21.5	14.4	12.9	7.7	230.0	12.4
Halton	107.0	7.3	37.4	182.3	6.5	.9	5.5	6.9	33.7	11.5	14.8	244.9	40.7
Hastings	41.3	5.9	34.6	205.6	4.4	1.2	26.9	22.1	47.2	13.6	6.0	185.9	12.2
Huron	46.4	3.6	49.6	213.5	7.1	14.4	0.9	8.2	27.4	6.6	13.8	210.4	32.7
Kent	133.9	0.7	31.2	143.6	1.9	57.3	1.9	1.4	159.1	10.0	20.2	158.9	14.1
Lambton	84.0	0.4	33.8	165.5	2.3	2.8	0.2	0.5	83.7	7.5	7.3	212.4	17.3
Lanark	4.0	20.1	16.9	145.1	2.8	.8	5.4	14.2	38.9	7.3	4.6	220.1	23.3
Leeds	7.8	5.7	16.0	171.7	2.2	0.9	6.3	16.4	53.2	10.7	4.7	239.0	21.5
Lennox & Add	26.5	8.3	33.2	154.4	3.6	1.0	19.4	19.5	32.8	13.2	5.0	262.0	32.6
Lincoln	102.3	0.9	15.2	138.4	3.7	3.6	2.2	1.9	51.0	14.7	5.0	290.4	14.0
Manitoulin	11.8	28.5	39.0	143.2	33.0	0.2	6.1	4.7	16.4	12.7	9.1	360.8	36.4
Middlesex	75.8	0.2	25.4	158.5	1.7	2.3	1.6	1.4	57.5	11.9	5.7	179.6	19.5
Muskoka	0.9	6.4	12.8	244.0	10.3	0.3	3.4	2.8	11.4	17.8	9.9	363.5	13.1
Nipissing	1.7	25.2	20.5	250.4	23.7	.1	1.0	3.3	6.6	21.8	10.1	360.3	14.2
Norfolk	112.6	0.3	21.6	152.8	5.5	7.0	47.0	36.9	89.4	14.7	5.4	199.2	20.1
Northumberland	56.8	15.2	28.6	186.4	5.6	2.2	59.8	36.2	45.1	13.1	16.0	164.1	30.9
Ontario	39.4	18.9	51.7	231.2	17.0	1.2	21.1	24.4	47.1	14.7	31.3	166.6	67.3
Oxford	73.1	0.2	36.4	190.0	1.7	0.7	5.3	9.4	89.3	8.1	20.6	207.7	54.1
Parry Sound	0.6	14.3	13.3	259.8	24.3	0.2	4.7	1.4	4.6	17.4	14.8	339.1	11.8
Peel	69.0	13.2	80.4	208.6	7.5	0.3	17.7	10.4	24.5	14.6	12.1	212.4	25.3
Perth	61.1	1.1	58.5	238.0	7.0	0.2	0.3	4.6	34.8	7.1	18.0	214.5	42.2
Peterborough	42.8	18.2	34.6	229.6	25.2	0.6	30.6	21.1	32.4	9.9	13.7	171.7	13.9
Prescott	1.4	20.8	31.4	226.5	3.4	1.3	1.0	6.6	32.9	11.2	3.6	368.8	14.1
Prince Edward	38.1	5.3	50.9	151.4	11.4	3.2	41.9	34.3	69.5	10.5	1.4	220.5	19.7
Rainy R'r & Kenora	1.1	41.2	41.4	181.9	3.8	0.3	0.9	0.5	2.6	25.0	6.6	405.6	4.9
Renfrew	6.0	102.8	12.1	180.0	28.3	0.9	32.4	5.3	19.1	10.7	3.5	244.0	11.7
Russell	2.1	23.5	28.4	219.7	8.9	1.2	0.7	10.4	42.1	12.0	4.6	330.4	21.9
Simcoe	108.3	6.8	82.0	209.3	14.8	0.5	21.9	23.3	26.8	14.9	15.2	158.1	32.6
Stormont	0.3	10.5	21.8	180.8	0.7	1.0	0.3	19.5	55.4	12.7	2.6	283.0	33.2
Sudbury	0.3	19.8	27.8	227.7	21.4	0.1	0.8	3.1	43.7	3.0	1.2	403.5	10.8
Thunder Bay	......	24.0	50.5	238.4	12.7	0.5	4.6	0.6	4.2	58.6	17.0	306.7	19.1
Timiskaming	4.3	35.7	33.7	314.9	26.3	0.2	....	0.3	0.2	22.9	10.8	295.5	11.0
Victoria	33.8	24.7	56.0	253.8	19.1	0.3	10.6	22.0	31.9	8.4	16.1	164.8	42.8
Waterloo	108.8	0.6	37.1	233.3	6.1	0.3	12.6	9.6	44.2	13.6	32.8	206.4	94.2
Welland	131.1	0.2	9.0	135.6	0.5	17.5	2.4	12.3	64.7	17.1	2.1	298.4	16.2
Wellington	22.6	7.9	44.5	225.3	13.8	0.2	4.1	18.0	20.7	10.9	26.9	231.6	87.5
Wentworth	96.9	1.4	32.7	177.8	0.9	0.6	9.3	8.2	43.9	21.7	18.1	243.2	41.9
York	84.5	19.7	75.0	233.9	16.4	0.7	10.1	23.1	39.6	19.0	22.0	193.2	46.7
The Province:													
1915	55.5	11.1	37.8	196.4	8.7	4.3	11.9	13.2	51.5	11.9	11.9	221.0	32.5
1914	47.0	8.1	39.7	190.2	12.2	3.5	9.5	12.1	48.6	11.5	11.5	234.0	31.3
1913	44.5	8.0	43.0	186.0	12.2	4.6	8.2	15.7	47.4	11.0	12.0	236.2	28.5
Average (10 yrs)													
1902-1911	51.3	13.0	50.7	192.8	27.7	3.6	8.0	9.4	40.1	10.9	15.8	219.0	†33.1
1892-1901	73.2	28.0	39.2	180.2	60.5	4.1	10.1	10.3	35.5	12.9	15.6	198.2	.....
1882-1891	81.6	50.9	67.2	150.4	60.5	2.4	9.4	6.2	17.7	14.0	12.2	207.1	.....
Average(34 years)													
1882- 915	65.2	26.5	50.2	177.7	43.5	3.5	9.1	8.7	42.1	12.4	15.3	211.5	‡32.01

* Including Sugar Beets. † Average for 5 years. ‡ Average for 9 years.

MARKET PRICES.

TABLE XVIII.—The following table shows by counties the average prices of agricultural products for 1915, together with the average price for 1913 and 1914, and the annual averages for various periods.

Counties and Districts.	Fall Wheat, per bush.	Spring Wheat, per bush.	Barley, per bush.	Oats, per bush.	Peas, per bush.	Beans, per bush.	Rye, per bush.	Buckwheat, per bush.	Corn (in ear) per bush.	Hay, per ton.	Potatoes, per bush.
	cts.	cts.	cts.	cts.	cts.	$ c.	cts.	cts.	cts.	$ c.	cts.
Algoma	109.7	107.8	65.6	43.7	144.3	2 50	69.2	71.0	52.7	13 31	83.4
Brant	98.5	95.0	53.2	39.8	138.2	2 95	77.3	72.9	52.4	13 42	103.3
Bruce	97.9	90.6	53.2	37.6	179.7	2 63	71.4	66.7	49.2	13 47	74.9
Carleton	103.3	105.9	62.9	41.0	171.0	3 12	74.3	71.4	55.0	17 23	81.9
Dufferin	101.6	100.2	55.9	39.6	159.7	3 10	79.2	70.3	52.0	11 21	74.8
Dundas	110.0	108.7	67.4	44.1	137.1	3 04	72.5	70.2	53.8	15 35	70.0
Durham	99.3	96.4	58.4	37.6	171.7	2 76	81.6	72.5	49.2	17 23	90.9
Elgin	95.3	94.7	60.3	41.7	133.8	3 13	79.7	70 3	49.2	12 65	96.5
Essex	96.6	93.9	58.0	36.0	160.0	2 79	75.2	69.6	41.0	12 77	85.0
Frontenac	98.5	99.5	61.1	41.5	131.5	2 58	79.8	71.5	56.2	17 44	94.1
Glengarry	103.8	108.7	65.8	43.5	147.7	2 86	80.0	71.1	51.1	16 52	75.0
Grenville	103.6	103.3	68.1	42.2	121.3	3 00	83.5	74.3	53.0	17 00	81.3
Grey	99.5	99.0	53.2	37.5	164.5	2 52	76.3	67.0	50.5	12 31	74.7
Haldimand	95.3	93.3	56.8	40.1	128.2	3 07	72.3	74.3	49.7	12 28	92.9
Haliburton	105.0	99.0	58.1	39.4	143.0	2 50	76.0	69.9	60.0	16 68	56.7
Halton	99.0	96.4	57.9	42.3	147.5	3 25	73.6	74.2	54.0	15 50	99.8
Hastings	98.9	98.8	62.2	40.3	134.0	3 01	76.3	72.0	60.0	16 69	87.0
Huron	98.5	95.8	51.6	37.8	172.0	3 12	76.0	68.3	51.2	12 49	87.6
Kent	95.3	92.0	49.5	36.6	131.3	3 10	66.0	64.6	39.5	11 41	94.0
Lambton	96.2	97.3	52.2	35.8	134.4	2 96	72.3	70.0	46.9	11 71	91.9
Lanark	104.8	102.6	60.7	39.6	151.6	2 94	77.4	68.3	50.0	18 18	77.6
Leeds	104.8	107.6	65.1	43.3	128.0	2 95	81.7	72.8	53.3	17 50	80.1
Lennox and Add	96.5	98.5	57.8	39.7	149.8	3 00	79.5	73.5	49.8	15 60	88.0
Lincoln	96.8	100.0	60.1	41.4	127.7	3 36	78.3	72.3	58.2	15 25	96.7
Manitoulin	100.6	98.5	61.8	40.4	154.0	2 50	75.0	67.5	50.0	12 06	62.2
Middlesex	95.2	97.1	52.5	39.0	123.9	3 06	72.3	72.7	49.2	14 12	101.3
Muskoka	105.0	104.6	69.2	44.8	156.5	3 00	78.3	66.7	50.0	15 96	73.1
Nipissing	106.7	99.1	68.5	41.0	160.6	3 00	68.3	65.0	50.0	16 52	63.7
Norfolk	96.0	95.0	58.0	41.7	134.4	2 98	79.0	74.0	48.8	12 44	91.4
Northumberland	97.2	96.2	57.2	38.7	173.5	3 04	81.8	73.5	49.8	17 29	95.4
Ontario	95.2	92.4	54.8	37.4	156.0	2 64	78.6	72.3	55.0	16 32	81.0
Oxford	98.9	97.6	56.0	41.7	125.2	3 18	82.0	75.1	52.9	13 76	98.2
Parry Sound	103.6	102.4	69.0	43.7	144.8	2 85	77.5	77.4	60.0	16 10	67.1
Peel	97.3	90.2	58.2	39.6	158.0	3 10	80.7	76.1	54.0	15 21	89.1
Perth	100.0	94.3	53.2	39.1	139.4	3 00	75.0	69.3	52.4	13 34	90.0
Peterborough	101.2	97.7	57.1	36.3	189.7	3 22	78.5	67.0	54.0	17 76	96.0
Prescott	105.0	103.4	67.6	43.2	182.2	3 08	72.2	76.7	58.0	16 14	70.0
Prince Edward	97.6	96.9	54.8	36.7	143.4	3 23	81.5	74.6	49.3	15 47	89.7
Rainy R. & Kenora	99.1	100.3	67.4	45.2	159.0	3 00	80.0	75.0	50.0	13 50	72.7
Renfrew	96.7	99.3	61.1	39.9	165.5	2 97	79.6	68.4	52.3	17 67	65.7
Russell	110.0	106.1	68.1	40.9	182.9	2 96	85.0	71.7	52.9	15 85	74.6
Simcoe	97.1	95.8	54.2	37.9	170.4	2 72	76.8	69.0	56.8	14 50	70.4
Stormont	108.0	108.0	67.2	42.7	125.0	3 02	80.0	73.3	54.6	15 70	74.7
Sudbury	112.5	113.9	71.3	46.8	155.0	3 00	70.0	68.3	50.0	14 86	74.3
Thunder Bay	......	105.7	63.3	46.2	191.0	3 00	70.0	70.0	50.0	15 40	62.1
Timiskaming	101.3	97.2	56.6	41.3	159.0	3 00	......	70.0	......	16 47	62.6
Victoria	94.5	88.1	52.0	37.1	168.6	2 80	75.9	70.1	56.0	15 63	75.2
Waterloo	98.4	99.0	58.5	42.9	150.0	3 44	79.8	73.5	52.5	14 58	92.3
Welland	96.2	98.3	57.8	42.8	120.6	3 94	70.0	72.5	50.6	14 16	95.8
Wellington	96.8	95.9	54.5	38.6	156.8	3 01	75.9	70.4	50.8	13 36	99.1
Wentworth	98.2	96.0	58.6	42.6	138.8	3 09	76.7	72.2	52.9	15 60	91.7
York	96.8	91.5	55.0	40.8	159.4	3 12	80.9	73.1	54.0	16 34	88.0
The Province:											
1915	97.1	98.6	56.0	39.5	161.6	3 11	78.9	71.5	45.4	14 51	81.4
1914	109.1	107.9	64.3	49.5	136.6	2 14	84.9	71.5	45.7	14 55	44.0
1913	85.0	87.9	55.5	36.9	100.6	1 70	66.2	63.5	43.0	13 07	63.7
Averages (10 years)											
1902-1911	83.6	81.2	50.1	36.7	74.8	1 48	60.2	52.4	38.2	9 97	51.4
1892-1901	67.8	67.5	38.5	27.9	53.5	93	44.9	38.7	25.0	7 97	33.6
1882-1891	90.0	89.6	54.5	34.3	61.6	1 16	60.0	41.5	......	10.34	45.0
Average (34 years)											
1882-1915	82.0	82.1	50.0	34.7	62.9	1 34	57.5	49.2	*33.7	9 95	45.4

* Average for 24 years, 1892-1915.

HORSES AND

TABLE XIX.—Showing by County Municipalities the number and value of Horses and Cattle June 30th, 1915, together with the totals

Counties and Districts.	Horses all ages.				Cattle.	
	Number on hand.	Value.	Horses sold.		Milch cows on Hand.	
			Number.	Value.	Number.	Value.
		$		$		$
Algoma	3,115	489,055	199	28,656	3,978	250,216
Brant	10,506	1,481,346	647	93,168	13,033	888,590
Bruce	29,924	4,009,816	3,500	521,500	28,515	1,761,086
Carleton	18,543	2,874,165	1,461	241,065	35,357	1,978,224
Dufferin	14,028	1,823,640	1,520	202,160	12,591	758,230
Dundas	9,370	1,227,470	855	110,295	24,868	1,487,604
Durham	15,573	2,164,647	1,488	212,784	15,643	940,770
Elgin	20,011	2,781,529	2,345	344,715	28,639	1,986,401
Essex	24,309	3,354,642	2,204	310,764	17,588	1,117,190
Frontenac	10,647	1,394,757	1,007	130,910	23,836	1,291,911
Glengarry	10,718	1,468,366	917	133,882	23,322	1,314,428
Grenville	7,740	1,006,200	698	88,646	18,632	1,012,463
Grey	34,369	4,574,184	3,415	474,685	35,182	2,125,345
Haldimand	13,086	1,805,868	1,293	186,192	14,265	908,395
Haliburton	1,720	235,640	230	30,130	2,318	116,225
Halton	9,018	1,298,592	764	116,128	11,477	771,943
Hastings	19,667	2,655,045	1,755	240,435	37,620	2,001,008
Huron	35,958	5,070,078	4,866	763,962	33,580	2,226,354
Kent	29,832	4,176,480	2,886	418,470	22,016	1,469,128
Lambton	27,286	3,738,182	2,845	409,680	28,257	1,864,962
Lanark	12,340	1,715,260	1,027	143,780	22,957	1,219,017
Leeds	11,064	1,438,320	782	102,442	32,781	1,792,793
Lennox & Addingt'n	11,737	1,455,388	920	128,800	19,142	1,029,648
Lincoln	9,933	1,400,553	644	89,516	8,724	578,401
Manitoulin	2,794	343,662	286	39,468	3,443	200,899
Middlesex	37,757	5,285,980	4,537	694,161	45,152	3,029,699
Muskoka	3,587	555,985	322	45,402	5,732	312,050
Nipissing	2,574	411,840	226	31,414	4,410	233,906
Norfolk	15,721	2,138,056	1,319	176,746	18,170	1,163,243
Northumberland	18,466	2,437,512	1,689	226,326	23,436	1,431,940
Ontario	22,937	3,279,991	2,551	405,609	23,362	1,520,633
Oxford	22,744	3,252,392	1,999	297,851	46,300	3,206,275
Parry Sound	3,952	592,800	390	50,700	5,931	323,062
Peel	14,574	2,113,230	1,498	229,194	17,388	1,121,178
Perth	26,916	3,768,240	2,928	456,768	34,539	2,297,534
Peterborough	12,735	1,706,490	1,248	172,224	18,367	1,004,491
Prescott	8,820	1,234,800	921	133,545	21,809	1,087,833
Prince Edward	9,975	1,216,950	855	115,425	14,155	782,772
Rainy R'r & Kenora	2,190	407,340	220	36,300	2,085	135,525
Renfrew	15,501	2,402,655	1,242	180,090	24,154	1,151,663
Russell	7,469	1,023,253	818	122,700	16,592	863,448
Simcoe	37,604	5,114,144	3,223	454,443	36,386	2,106,749
Stormont	8,222	1,077,082	634	88,760	22,723	1,219,316
Sudbury	2,229	352,182	285	41,895	3,900	211,302
Thunder Bay	1,524	283,464	67	9,045	2,343	177,131
Timiskaming	1,394	243,950	202	31,512	1,398	94,770
Victoria	15,334	2,070,090	1,558	230,584	16,609	964,983
Waterloo	14,729	1,988,415	1,591	222,740	16,855	1,102,654
Welland	10,561	1,489,101	764	109,252	11,808	759,845
Wellington	27,254	3,652,036	2,688	397,824	26,486	1,823,031
Wentworth	13,482	1,927,926	769	104,584	15,223	992,844
York	27,592	3,973,248	2,429	376,495	29,441	1,987,856
The Province:						
1915	779,131	107,982,037	75,527	11,003,822	1,022,518	62,196,964
1914	774,544	112,576,793	80,872	12,480,960	1,006,703	57,396,788
1913	751,726	113,240,047	96,841	15,507,939	1,032,039	52,176,881
1912	742,139	109,000,214	101,911	15,793,129	1,044,177	49,929,061
1911	737,916	103,373,206	105,741	15,616,714	1,045,610	47,377,588

CATTLE.

on hand July 1, 1915 and the number and value of those sold or slaughtered in the year ending for the Province for the past five years.

Cattle.						Counties and Districts.
Other cattle on hand.		Total on hand.		Sold or slaughtered.		
Number.	Value.	Number.	Value	Number.	Value.	
	$		$		$	
6,227	166,261	10,205	416,477	2,937	120,828	Algoma.
20,299	672.506	33,332	1,561,096	11,079	587,409	Brant.
74,871	2,529,891	103,386	4,290,977	35,543	2,158,526	Bruce.
48,396	1,628,525	83,753	3,606,749	25,978	1,160,697	Carleton.
32,648	1,124,724	45,239	1,882,954	14,080	794,394	Dufferin.
17,889	422,538	42,757	1,910,142	9,488	351,625	Dundas.
32,585	982,438	48,228	1,923,208	16,243	869,975	Durham.
41,390	1,519,013	70,029	3,505,414	26,390	1,475,729	Elgin.
25,874	792,003	43,462	1,909,193	14,039	624,314	Essex.
23,333	640,724	47,169	1,932,635	14,627	526,572	Frontenac.
18,052	455,994	41,374	1,770,422	9,795	341,356	Glengarry.
16,383	462,656	35,015	1,475,119	9,368	354,110	Grenville.
84,002	2.878,749	119,184	5,004,094	40,354	2,249,736	Grey.
24,219	775,008	38,484	1,683,403	13,788	656,447	Haldimand.
4,914	121,916	7,232	238,141	2,716	93,756	Haliburton.
20,815	726,235	32,292	1,498,178	11,146	636,214	Halton.
44,119	1,012,972	81,739	3,013,980	24,623	722,931	Hastings.
89,376	3,520,521	122,956	5,746,875	43,869	2,709,788	Huron.
48,410	1,887,990	70,426	3,357,118	26,106	1,498,484	Kent.
71,919	2,771,039	100,176	4,636,001	36,494	2,102,784	Lambton.
43,685	1,148,916	66,642	2,367,933	19,176	819,966	Lanark.
27,609	667,310	60,390	2,460,103	13,457	499,255	Leeds.
25,047	611,648	44,189	1,641,296	12,959	463,155	Lennox & Addington.
10,623	333,137	19,347	911,538	6,115	262,211	Lincoln.
8,140	220,024	11,583	420,923	3,256	155,637	Manitoulin.
96,400	3,871,424	141,552	6,901,123	55,072	3,097.800	Middlesex.
9,023	227,560	14,755	539,610	4,901	172,417	Muskoka.
6,867	156,430	11,277	390,336	3,789	128,106	Nipissing.
22,684	658,517	40,854	1,821,760	13,515	540,870	Norfolk.
34,297	979,522	57,733	2,411,462	19,110	773,382	Northumberland.
50,483	1,756,304	73,845	3,276,937	23,500	1,372,870	Ontario.
45,151	1,609,182	91,451	4,815,457	26,648	1,391,559	Oxford.
11,532	293,951	17,463	617,013	6,259	234,587	Parry Sound.
28,329	1,041,941	45,717	2,163,119	17,615	1,021,846	Peel.
61,797	2,006,549	96,336	4,304,083	29,913	1,567,142	Perth.
30,704	814,884	49,071	1,819,375	15,038	609,189	Peterborough.
19,824	382,405	41,633	1,470,238	8,972	298,409	Prescott.
13,657	322,988	27,812	1,105,760	8,560	300,028	Prince Edward.
3,470	100,422	5,555	235,947	1,662	66,480	Rainy River & Kenora.
47,832	1,180,015	71,986	2,331,678	22,499	902,210	Renfrew.
16,751	436,029	33,343	1,299,477	8,785	299,744	Russell.
75,866	2,233,495	112,252	4,340,244	35,292	1,770,247	Simcoe.
14,429	346,873	37,152	1,566,189	7,474	259,871	Stormont.
5,720	129,444	9,620	340,746	3,260	107,678	Sudbury.
3,381	95,175	5,724	272,306	2,022	75,825	Thunder Bay.
1,682	42,386	3,080	137,156	1,448	56,762	Timiskaming.
36,754	1,074,319	53,363	2,039,302	18,530	883,140	Victoria.
27,245	921,698	44,100	2,024,352	20,483	1,211,569	Waterloo.
14,428	430,964	26,236	1,190,809	8,574	381,886	Welland.
60,225	2,113,295	86,711	3,936,326	34,028	2,009,013	Wellington.
18,665	623,411	33,888	1,616,255	11,698	572,617	Wentworth.
34,207	1,244,451	63,648	3,232,307	23,121	1,337,087	York.
						The Province:
1,652,228	53,166,372	2,674,746	115,363,336	875,394	43,678,233	1915.
1,597,925	49,238,360	2,604,628	106,635,148	911,794	42,978.531	1914.
1,596,806	43,582,141	2,628,845	95,759,022	880,303	38,751,801	1913.
1,580,603	40,474,841	2,624,780	90,403,902	849,140	36,269,271	1912.
1,547,595	37,257,374	2,593,205	84,634,962	837,544	34,065,248	1911.

SHEEP, SWINE

TABLE XX.—Showing by County Municipalities the number and value of Sheep, Swine and year ending June 30, 1915, together with the

Counties and Districts.	Sheep and Lambs.				Swine.	
	Number on hand.	Value.	Sold or slaughtered.		Number on hand.	Value.
			Number.	Value.		
		$		$		$
Algoma	8,980	57,831	4,245	25,810	4,497	42,766
Brant	9,524	73,430	4,578	33,419	26,045	271,649
Bruce	39,240	276,756	23,353	155,064	51,400	503,720
Carleton	26,627	189,052	13,396	90,959	28,535	292,484
Dufferin	24,196	170,098	13,310	88,245	29,382	288,237
Dundas	4,878	30,048	2,333	14,395	23,477	231,953
Durham	26,249	195,030	13,976	98,671	29,507	285,923
Elgin	21,615	165,787	11,318	80,245	61,565	591,640
Essex	19,814	137,311	10,212	65,153	132,486	1,257,292
Frontenac	15,360	108,134	9,497	61,825	18,663	183,831
Glengarry	5,509	37,847	3,309	19,126	16,086	167,616
Grenville	8,451	56,284	5,846	37,005	15,030	157,815
Grey	63,810	459,432	37,298	250,643	63,649	640,945
Haldimand	14,252	101,474	8,013	54,889	25,119	251,944
Haliburton	5,332	30,232	2,911	15,137	2,146	21,052
Halton	8,787	69,681	4,713	34,970	20,113	204,549
Hastings	28,267	170,450	14,479	88,177	44,048	444,004
Huron	25,866	190,374	13,732	98,596	74,564	748,623
Kent	20,625	154,894	11,789	84,881	124,788	1,165,520
Lambton	30,056	226,622	16,332	120,857	67,904	672,250
Lanark	32,985	212,094	15,981	102,278	21,725	208,560
Leeds	13,015	85,899	6,279	41,441	25,359	245,475
Lennox and Addington	13,590	84,938	7,067	42,614	17,969	185,081
Lincoln	5,044	40,352	3,019	21,405	13,277	141,002
Manitoulin	17,539	104,006	7,370	40,240	4,609	37,333
Middlesex	25,030	200,991	15,736	118,492	66,897	673,653
Muskoka	12,246	75,803	6,010	35,399	3,205	33,653
Nipissing	6,148	34,552	3,817	20,574	4,874	44,451
Norfolk	14,563	98,300	7,961	50,473	37,959	360,611
Northumberland	14,275	110,203	7,350	52,406	34,020	340,880
Ontario	33,326	267,275	16,464	127,925	52,530	525,300
Oxford	9,542	74,618	5,360	39,503	62,817	633,195
Parry Sound	17,458	111,731	8,426	47,354	5,351	52,333
Peel	10,236	82,400	6,169	45,342	27,419	277,206
Perth	13,074	104,200	8,284	59,728	74,930	796,506
Peterborough	15,272	99,268	7,767	48,854	21,973	224,344
Prescott	7,887	48,663	5,920	32,501	16,107	176,694
Prince Edward	10,209	70,238	5,344	34,148	14,250	146,633
Rainy River and Kenora	1,087	8,598	557	4,055	3,255	35,056
Renfrew	51,328	284,357	22,899	129,379	24,666	211,881
Russell	3,797	25,516	2,121	14,168	14,414	140,537
Simcoe	55,930	398,222	30,310	197,015	86,505	815,742
Stormont	4,968	32,739	2,851	17,961	19,656	188,501
Sudbury	5,020	29,819	2,730	17,144	4,670	53,658
Thunder Bay	428	2,923	128	896	3,264	34,598
Timiskaming	1,172	7,571	334	2,128	1,260	15,901
Victoria	25,466	172,659	12,648	80,441	32,708	311,380
Waterloo	5,730	44,694	4,097	29,826	43,019	427,609
Welland	6,758	44,130	4,448	27,266	14,062	147,510
Wellington	39,313	325,119	20,013	158,103	71,103	784,977
Wentworth	10,122	78,850	5,830	44,075	26,153	273,037
York	18,099	148,412	11,390	88,500	60,285	595,616
The Province:						
1915	908,095	6,403,907	489,320	3,289,701	1,769,295	17,562,726
1914	922,375	6,155,451	512,066	3,219,409	1,770,533	17,951,258
1913	996,155	6,242,672	534,311	3,163,752	1,618,734	15,393,192
1912	1,021,848	6,181,595	531,957	3,054,930	1,702,652	14,141,908
1911	1,040,245	6,213,021	505,015	2,839,888	1,744,983	14,593,917

AND POULTRY.

Poultry on hand on July 1, 1915, and the number and value of those sold or slaughtered in the totals for the Province for the past five years.

Swine.		Poultry of all classes.				Counties and Districts.
Sold or slaughtered.		Number on hand.	Value.	Sold or slaughtered.		
Number.	Value.			Number.	Value.	
	$		$		$	
4,954	62,519	63,419	38,916	35,930	23,355	Algoma.
31,356	490,721	163,977	87,489	81,641	52,250	Brant.
73,700	1,100,341	490,386	241,718	219,678	131,807	Bruce.
36,453	524,559	355,798	217,923	189,686	132,780	Carleton.
35,153	544,168	193,019	101,451	86,484	51,890	Dufferin.
30,558	426,284	250,909	138,139	102,618	65,676	Dundas.
40,674	633,294	290,624	154,830	129,948	79,268	Durham.
69,799	1,049,777	416,220	214,731	194,604	118,708	Elgin.
112,788	1,804,608	630,940	309,236	278,686	153,277	Essex.
22,904	335,544	182,608	112,716	117,927	75,473	Frontenac.
17,389	267,791	177,385	101,141	87,683	53,487	Glengarry.
19,611	286,713	179,592	100,092	88,328	54,763	Grenville.
83,847	1,252,674	541,361	264,653	249,794	149,876	Grey.
32,429	469,572	235,890	127,605	120,528	72,317	Haldimand.
2,754	35,802	27,174	14,103	12,800	7,680	Haliburton.
27,550	400,577	160,806	100,656	93,528	64,534	Halton.
55,139	800,618	371,279	192,040	173,899	104,339	Hastings.
100,506	1,555,833	695,213	342,555	290,145	171,186	Huron.
121,183	1,898,938	678,960	321,546	284,341	153,544	Kent.
76,021	1,172,244	585,607	291,030	258,212	152,345	Lambton.
27,603	403,004	209,019	113,568	95,606	59,276	Lanark.
29,261	415,506	212,726	117,527	101,751	61,051	Leeds.
24,164	350,136	209,797	118,394	100,862	60,517	Lennox & Addington.
18,205	271,255	178,891	100,567	108,632	70,611	Lincoln.
5,800	63,800	42,304	22,652	22,231	13,339	Manitoulin.
81,218	1,232,889	753,700	425,374	359,724	223,029	Middlesex.
5,130	69,871	69,120	36,636	38,677	21,659	Muskoka.
4,401	65,091	45,334	23,512	22,976	13,556	Nipissing.
46,641	663,235	340,263	174,057	157,394	86,567	Norfolk.
44,368	631,800	334,585	187,561	143,674	84,768	Northumberland.
60,856	910,406	344,945	198,878	179,324	118,354	Ontario.
77,622	1,187,617	400,442	212,107	170,663	100,691	Oxford.
7,360	96.710	71,214	38,502	36,543	22,291	Parry Sound.
36,302	551,790	253,283	164,833	152,258	108,103	Peel.
94,779	1,456,753	510,027	261,155	209,916	125,950	Perth.
28,614	402,027	223,885	123,358	100,532	61,325	Peterborough.
12,852	208,331	166,071	99,211	82,236	50,986	Prescott.
20,071	272,363	159,099	84,288	73,577	44,146	Prince Edward.
3,961	55,177	49,258	27,807	22,297	14,047	Rainy River and Kenora.
20,762	309,146	234,290	127,183	108,250	66,033	Renfrew.
14,533	218,867	120,976	67,178	67,471	41,832	Russell.
101,569	1,532,676	603,946	313,290	261,996	162,438	Simcoe.
23,902	360,203	181,139	104,427	77,871	47,501	Stormont.
3,640	56,384	48,778	27,457	25,833	16,016	Sudbury,
3,171	40,462	46,016	26,414	20,287	12,578	Thunder Bay.
2,053	29,871	30,461	16,947	15,631	9,848	Timiskaming.
39,891	590,387	249,268	131,758	104,882	63,978	Victoria.
53,895	785,250	235,331	113,056	103,157	57,768	Waterloo.
19,251	272,787	223,531	121,499	133,057	79,834	Welland.
94,403	1,374,508	409,728	226,054	201,189	134,797	Wellington.
34,415	507,277	198,005	123,270	110,197	73,832	Wentworth.
75,475	1,130,616	426,492	269,236	258,915	186,419	York.
						The Province:
2,110,936	31,628,772	14,273,091	7,670,326	6,764,069	4,161,695	1915.
1,984,105	30,275,538	14,175,214	7,551,428	6,575,434	4,062,797	1914.
2,078,462	28,378,551	13,511,383	6,956,952	6,325,007	3,848,973	1913.
2,088,874	26,656,149	13,024,983	6,121,323	5,501,913	3,208,860	1912.
1,963,937	25,318,455	12,942,293	5,905,318	5,011,313	2,835,085	1911.

WOOL CLIP, POULTRY ON HAND AND LIVE STOCK SOLD.

TABLE XXI. Showing by County Municipalities the number of pounds of wool, the number of turkeys, geese, ducks and other fowls on hand June 30th, 1915; also the value of all live stock sold or killed in the year ending June 30, 1915, together with the totals for the Province for the past five years.

Counties and Districts.	Wool Clip.	Poultry on Hand.				Total value of Live Stock sold or killed.
		Turkeys.	Geese.	Ducks.	Other fowl.	
	lbs.	No.	No.	No.	No.	$
Algoma	35,245	5,166	1,399	596	56,258	261 168
Brant	38,442	1,058	4,144	5,536	153,239	1,256,967
Bruce	145,043	32,695	18,436	23,800	415,455	4,067,238
Carleton	86,375	19,831	13,711	13,930	308,326	2,150,060
Dufferin	84,296	6,690	14,132	7,959	164,238	1,680,857
Dundas	19,570	17,927	6,972	7,831	218,179	968,275
Durham	106,820	10,741	11,840	11,124	256 919	1,893,992
Elgin	83,957	22,449	8,418	11,856	373,497	3,069,174
Essex	87,093	15,349	13,207	28,250	574,134	2,958,116
Frontenac	53,440	22,320	3,947	7,573	148,768	1,130,324
Glengarry	17,532	15,408	3,728	4,284	153,965	815,642
Grenville	27,719	12,772	4,906	6,709	155,205	821,237
Grey	209,718	28,782	22,767	23,161	466,651	4,377,614
Haldimand	51,420	8,198	6,874	9,161	211,657	1,439,417
Haliburton	17,969	2,580	442	574	23,578	182,505
Halton	36,406	4,256	6,715	7,539	142,296	1,252,423
Hastings	83,590	22,922	8,442	8,413	331,502	1,956,500
Huron	96,136	30,532	19,356	37,182	608,143	5,299,365
Kent	98,018	17,597	13,977	33,196	614,190	4,054,317
Lambton	124,663	36,647	14,434	26,533	507,993	3,957,910
Lanark	92,526	14,583	4,998	4,041	185,397	1,528,304
Leeds	35,403	17,877	3,770	8,524	182,555	1,119,695
Lennox & Addington	44,380	17,751	3,904	4,883	183,259	1,045,222
Lincoln	19,128	3,839	2,304	6,824	165,924	714,998
Manitoulin	69,717	4,243	1,177	1,717	35,167	312,484
Middlesex	116,702	56,223	16,960	27,157	653,360	5,366,371
Muskoka	38,084	2,731	423	1,052	64,914	344,748
Nipissing	21,478	882	801	630	43,021	258,741
Norfolk	52,432	12,228	6,100	9,737	312,198	1,517,891
Northumberland	61,358	17,010	6,972	6,929	303,674	1,768,682
Ontario	145,723	6,438	15,848	15,969	306,690	2,935,164
Oxford	41,076	9,755	7,956	13,449	369,282	3,017,221
Parry Sound	63,230	4,740	1,818	1,276	63,380	451,642
Peel	40,191	13,692	11,844	16,276	211,471	1,956,275
Perth	47,560	12,201	18,550	28,957	450,319	3,666,341
Peterborough	54,166	17,959	7,052	6,147	192,727	1,293,619
Prescott	27,537	13,892	5,817	3,646	142,716	723,772
Prince Edward	29,872	8,010	2,147	3,991	144,951	766,110
Rainy River & Kenora	4,521	2,819	729	1,372	44,338	176,059
Renfrew	137,344	9,825	7,693	5,235	211,537	1,586,858
Russell	13,594	4,067	5,151	5,292	106,466	697,311
Simcoe	223,510	30,930	24,626	17,906	530,484	4,116,819
Stormont	17,784	15,106	3,211	4,421	158,401	774,296
Sudbury	16,780	2,140	662	430	45,546	239,117
Thunder Bay	1,654	1,434	396	602	43,584	138,806
Timiskaming	4,082	646	205	604	29,006	130,121
Victoria	99,025	14,178	11,237	9,877	213,976	1,848,530
Waterloo	20,054	1,567	5,556	5,861	222,347	2,307,153
Welland	20,882	3,578	2,185	9,598	208,170	871,025
Wellington	152,573	5,957	18,268	16,229	369,274	4,074,245
Wentworth	37,729	2,041	5,184	8,926	181,854	1,302,385
York	80,230	12,232	15,023	23,048	376,189	3,119,117
The Province:						
1915	3,333,768	674,494	416,414	545,813	12,636,370	93,762,223
1914	3,370,225	744,096	425,300	586,654	12,419,164	93,017,235
1913	3,647,245	699,861	389,173	497,734	11,924,615	89,651,116
1912	3,669,419	660,843	362,674	415,251	11,586,215	84,982,339
1911	3,780,798	638.943	365.876	404,679	11,532.795	80.675,390

FARM PROPERTY, IMPLEMENTS AND LIVE STOCK.

TABLE XXII.—Showing by County Municipalities of Ontario the value of farm lands, buildings, implements and live stock for the year 1915, together with the totals for the Province for the past five years.

Counties and Districts.	Land.	Buildings.	Implements.	Live Stock. on hand	Total.
	$	$	$	$	$
Algoma	3,511,846	1,187,385	439,585	1,045,045	6,183,861
Brant	11,093,271	5,780,067	1,390,378	3,475,010	21,738,726
Bruce	26,222,360	11,970,728	3,099,041	9,316,987	50,609,116
Carleton	22,784,254	8,495,208	2,493,516	7,180,373	40,953,351
Dufferin	11,390,123	5,408,700	1,303,110	4,266,380	22,368,313
Dundas	10,021,359	4,916,201	1,533,557	3,537,752	20,008,869
Durham	13,250,391	6,848,011	1,658,742	4,723,638	26,480,782
Elgin	21,122,043	9,803,779	2,742,345	7,259,101	40,927,268
Essex	30,826,792	11,052,621	3,358,703	6,966,674	52,204,790
Frontenac	10,690,928	4,577,783	1,351,779	3,732,073	20,352,563
Glengarry	10,355,890	4,895,839	1,448,336	3,545,392	20,245,457
Grenville	7,068,419	3,898,777	1,039,639	2,795,510	14,802,345
Grey	27,115,405	14,038,882	3,702,534	11,043,308	55,900,129
Haldimand	11,041,640	5,843,327	1,670,204	3,971,294	22,526,465
Haliburton	1,477,046	475,773	214,742	539,168	2,706,729
Halton	12,915,231	5,173,552	1,257,963	3,171,656	22,518,402
Hastings	19,129,869	8,095,148	2,492,578	6,475,519	36,193,114
Huron	30,159,363	15,203,897	3,640,935	12,098,505	61,102,700
Kent	35,468,184	13,006,742	3,841,491	9,175,558	61,491,975
Lambton	26,685,075	11,073,827	3,224,654	9,564,085	50,547,641
Lanark	12,524,285	4,830,394	1,542,489	4,617,415	23,514,583
Leeds	11,412,042	5,436,077	1,573,401	4,347,324	22,768,844
Lennox & Addington	10,639,304	5,146,339	1,515,990	3,485,097	20,786,730
Lincoln	20,162,093	7,024,965	1,635,620	2,594,012	31,416,690
Manitoulin	1,768,778	774,006	268,207	928,576	3,739,567
Middlesex	37,908,390	17,068,261	4,137,348	13,487,121	72,601,120
Muskoka	3,288,088	1,506,851	536,761	1,241,687	6,573,387
Nipissing	3,003,754	943,496	470,167	904,691	5,322,108
Norfolk	15,103,260	7,514,231	2,019,376	4,592,784	29,229,651
Northumberland	15,343,054	7,851,862	2,035,753	5,487,618	30,718,287
Ontario	20,267,166	9,831,352	2,408,329	7,548,381	40,055,228
Oxford	24,515,212	12,129,524	3,041,754	8,987,769	48,674,259
Parry Sound	3,211,371	1,464,987	547,616	1.312,379	6,536,353
Peel	15,472,009	7,400,322	1,635,142	4,800,788	29,308,261
Perth	23,840,409	12,625,986	3,039,969	9,234,184	48,740,548
Peterborough	13,032,424	5,339,702	1,298,469	3,972,835	23,643,430
Prescott	12,671,469	5,044,425	1,539,757	3,029,606	22,285,257
Prince Edward	8,288,860	4,411,203	1,285,197	2,623,869	16,609,129
Rainy River & Kenora	2,827,057	650,240	298,848	714,748	4,490,893
Renfrew	15,333,752	5,793,455	2,052,496	5,357,754	28,537,457
Russell	10,157,711	3,756,594	1,261,141	2,555,961	17,731,407
Simcoe	31,739,873	14,970,746	4,066,637	10,981,642	61,758,898
Stormont	8,146,545	4,130,093	1,153,669	2,968 938	16,399,245
Sudbury	3,452,243	841,935	426,194	803,862	5,524,234
Thunder Bay	4,575,835	669,296	294,983	619,705	6,159,819
Timiskaming	2,714,551	567,782	298,244	421,525	4,002,102
Victoria	14,294,240	5,440,481	1,545,549	4,725,189	26,005,459
Waterloo	14,300,291	7,656,715	1,938,413	4,598,126	28,493,545
Welland	12,497,582	5,662,661	1,537,647	2,993,049	22,690,939
Wellington	23,096,053	12,459,781	2,907,291	8,924,512	47,387,637
Wentworth	19,434,103	7,975,691	1,917,412	4,019,338	33,346,544
York	37,042,271	13,962,331	2,915,649	8,218,819	62,139,070
The Province:					
1915	794,393,564	352,628,031	95,049,350	254,982,332	1,497,053,277
1914	790,538,706	347,348,643	91,703,876	250,870,078	1,480,461,303
1913	782,993,853	345,303,335	89,702,273	237,591,885	1,455,591,346
1912	758,729,268	335,141,520	86,231,210	225,848,942	1,405,950,940
1911	723,902,419	317,876,963	84,969,426	214,720,424	1,341,469,232

FARM VALUES PER ACRE.

TABLE XXIII.—Showing by County Municipalities of Ontario average values per acre of farm property in 1915, together with the average for the Province for 1914 and preceding years at ten-year intervals, from 1882-1912.

Counties and Districts.	Farm values, average per acre occupied.					Values buildings, Implements, and live stock, per acre, cleared
	Land.	Buildings.	Implements.	Live Stock.	Total.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Algoma	11 40	3 86	1 43	3 39	20 08	55 67
Brant	51 38	26 77	6 44	16 10	100 69	59 17
Bruce	28 04	12 80	3 32	9 96	54 12	41 94
Carleton	40 73	15 19	4 46	12 84	73 22	49 69
Dufferin	32 00	15 19	3 66	11 98	62 83	40 11
Dundas	42 30	20 75	6 48	14 93	84 46	56 26
Durham	35 89	18 55	4 49	12 79	71 72	43 20
Elgin	48 51	22 52	6 30	16 67	94 00	54 91
Essex	72 45	25 98	7 89	16 37	122 69	60 04
Frontenac	15 34	6 57	1 94	5 36	29 21	37 36
Glengarry	35 94	16 99	5 03	12 30	70 26	50 95
Grenville	25 84	14 25	3 81	10 22	54 12	41 36
Grey	25 53	13 22	3 48	10 40	52 63	41 64
Haldimand	39 30	20 80	5 95	14 14	80 19	47 70
Haliburton	2 52	0 81	0 37	0 92	4 62	26 86
Halton	57 32	22 96	5 58	14 08	99 94	55 11
Hastings	17 69	7 49	2 30	5 99	33 47	38 41
Huron	37 78	19 04	4 56	15 15	76 53	46 71
Kent	62 47	22 91	6 76	16 16	108 30	55 34
Lambton	40 47	16 80	4 89	14 50	76 66	48 10
Lanark	18 64	7 19	2 30	6 87	35 00	32 86
Leeds	24 21	11 53	3 34	9 22	48 30	41 87
Lennox and Addington	24 02	11 62	3 42	7 87	46 93	40 05
Lincoln	106 22	37 01	8 62	13 66	165 51	69 09
Manitoulin	6 16	2 69	0 93	3 23	13 01	40 63
Middlesex	50 10	22 56	5 47	17 83	95 96	52 49
Muskoka	5 85	2 68	0 96	2 21	11 70	46 50
Nipissing	9 58	3 01	1 50	2 88	16 97	43 98
Norfolk	38 10	18 96	5 09	11 59	73 74	50 54
Northumberland	35 06	17 94	4 65	12 54	70 19	43 81
Ontario	39 83	19 32	4 73	14 84	78 72	52 02
Oxford	51 93	25 70	6 44	19 04	103 11	60 41
Parry Sound	5 04	2 30	0 86	2 06	10 26	38 89
Peel	53 73	25 70	5 68	16 67	101 78	52 55
Perth	46 01	24 37	5 87	17 82	94 07	55 02
Peterborough	22 30	9 13	2 22	6 80	40 45	40 69
Prescott	43 33	17 25	5 26	10 36	76 20	46 87
Prince Edward	35 56	18 93	5 51	11 26	71 26	42 24
Rainy River and Kenora	7 45	1 71	0 79	1 88	11 83	43 26
Renfrew	14 35	5 42	1 92	5 02	26 71	35 97
Russell	40 51	14 98	5 03	10 19	70 71	51 14
Simcoe	32 70	15 42	4 19	11 31	63 62	44 54
Stormont	32 65	16 55	4 62	11 90	65 72	52 64
Sudbury	8 67	2 12	1 07	2 02	13 89	39 59
Thunder Bay	10 67	1 56	0 69	1 44	14 36	49 19
Timiskaming	9 41	1 97	1 03	1 46	13 87	47 61
Victoria	24 01	9 14	2 59	7 94	43 68	40 60
Waterloo	46 42	24 85	6 29	14 92	92 48	56 18
Welland	55 27	25 04	6 80	13 24	100 35	55 11
Wellington	36 83	19 87	4 63	14 23	75 56	48 22
Wentworth	72 38	29 70	7 14	14 97	124 19	65 17
York	69 65	26 25	5 48	15 45	116 83	57 34
The Province:—						
1915	31 76	14 10	3 80	10 19	59 85	48 06
1914	31 70	13 93	3 68	10 06	59 37	47 27
1912	30 47	13 46	3 46	9 07	56 46	44 80
1902	25 49	10 00	2 62	5 93	44 04	32 43
1892	27 19	8 64	2 25	5 19	43 27	30 38
1882	32 23	6 76	1 89	4 10	44 98	24 52

CHEESE FACTORIES.

TABLE XXIV.—Showing by Counties of Ontario the number of cheese factories in operation, the quantity and value of cheese and butter made, and the value of cream, casein and milk sold in 1915, together with comparative figures for the Province for 1909–1915.

Counties and Districts.	Cheese factories.				Butter plants at Cheese factories.			
	No. of factories.	Milk used for cheese.	Cheese made.	Value.	Number operated.	*Butter made.	Value.	Value of milk, cream and casein sold.
		Lbs.	Lbs.	$		Lbs.	$	$
Brant	6	9,017,418	793,702	119,437	....	....	....	102
Bruce	5	6,092,045	563,217	80,367	....	....	....	....
Carleton	53	55,788,350	5,139,695	764,706	7	23,667	6,535	....
Dufferin	2	1,585,013	152,273	22,047	....	....	....	....
Dundas	62	80,334,860	7,325,434	1,086,368	20	80,612	20,950	1,825
Durham	2	1,644,762	152,110	22,499	....	....	....	....
Elgin	18	46,694,344	4,193,857	640,473	1	38,308	9,960	4,345
Frontenac	67	79,547,702	7,274,836	1,101,388	17	69,450	18,762	....
Glengarry	71	65,521,792	6,146,532	925,840	3	15,998	4,998	....
Grenville	43	51,353,071	4,672,013	712,556	4	9,397	2,403	....
Haldimand	3	4,893,902	450,850	66,629	1	14,928	4,961	....
Hastings	79	98,017,118	8,947,100	1,358,543	....	....	....	....
Huron	4	7,229,785	664,160	97,847	....	....	....	....
Lambton	5	6,555,677	605,360	89,652	2	36,756	10,825	981
Lanark	43	46,110,720	4,234,330	636,274	9	46,049	12,887	....
Leeds	97	143,043,105	12,777,892	1,959,274	36	212,347	57,330	4,889
Lennox and Add.	30	60,810,860	5,747,583	876,256	5	21,618	5,805	....
Lincoln	1	1,348,032	128,746	19,062	....	....	....	....
Middlesex	24	67,045,499	6,050,265	926,667	1	46,017	12,747	....
Norfolk	10	14,366,688	1,271,407	186,806	1	19,825	5,500	....
Northumberland	37	47,689,080	4,264,010	649,157	....	....	....	....
Oxford	39	124,996,980	11,189,813	1,762,911	10	367,112	112,497	15,822
Perth	22	56,605,878	5,212,217	776,207	6	282,451	85,745	....
Peterborough	33	32,378,290	2,906,148	436,055	11	72,322	20,765	....
Prescott	73	55,698,252	5,287,090	795,562	2	989	316	2,832
Prince Edward	23	45,205,220	4,098,455	630,642	7	42,853	11,888	3,520
Renfrew	17	14,019,586	1,311,096	189,888	2	25,484	6,956	....
Russell	61	54,544,138	5,196,691	767,562	3	23,783	7,440	....
Stormont	51	71,736,541	6,627,881	928,863	5	30,267	7,678	6,642
Victoria	8	7,892,672	733,169	106,284	....	....	....	....
Waterloo	2	3,583,666	334,605	50,190	....	....	....	....
Wellington	3	4,529,971	408,016	59,038	2	42,083	12,762	....
Wentworth	1	1,366,724	130,473	19,336	....	....	....	....
The Province:								
1915	995	1,367,247,741	124,991,026	18,864,386	155	1,522,316	439,710	40,958
1914	968	1,115,811,492	101,712,336	13,602,745	159	1,500,215	402,580	74,531
1913	1,002	1,209,890,007	110,795,926	13,890,656	154	1,562,294	426,216	172,657
1912	1,055	1,405,921,858	129,653,063	16,574,573	144	1,765,950	505,532	132,731
1911	1,077	1,369,856,680	127,123,016	15,491,406	157	1,963,768	491,448	164,412
1910	1,102	1,451,244,620	135,521,390	14,491,410	....	....	....	....
1909	1,177	....	125,611,359	14,193,918	....	....	....	....

*Including 423,888 lbs. whey butter, valued at $110,911 in 1915.

Note.—The statistics in this and following table have been compiled by this Bureau from returns made by the staff of instructors under the direction of the Dairy Branch of the Ontario Department of Agriculture.

CREAMERIES.

TABLE XXV. Showing by counties of Ontario the number of Creameries in operation, the quantity and value of butter made, the value of cream, casein and milk sold in 1915, together with comparative figures for the Province for 1909-1915.

Counties and Districts.	Creameries.			
	No. of Creameries.	Lbs. of Butter.	Value of Butter.	Value of milk, cream and casein sold.
			$	$
Brant	5	955,000	281,885	....
Bruce	9	1,537,383	411,733	....
Carleton	4	818,334	253,341	....
Dufferin	2	216,000	58,320	....
Durham	6	450,420	131,609	11,826
Elgin	2	95,624	25,929	....
Essex	3	161,000	45,190	....
Grey	8	730,812	202,553	....
Haldimand	8	1,241,003	356,933	18,091
Halton	1	200,000	56,000	....
Hastings	2	789,551	116,548	500
Huron	10	1,852,814	530,389	....
Kent	5	380,000	108,470	....
Lambton	8	1,297,040	373,977	....
Lanark	1	23,625	7,088	....
Lincoln	2	279,577	84,070	....
Middlesex	7	1,902,670	547,892	....
Norfolk	7	813,147	232,097	34,122
Northumberland	1	192,443	54,458	....
Ontario	6	540,610	158,970	....
Oxford	5	415,384	125,162	*190,269
Perth	9	1,082,039	309,776	....
Peterborough	3	185,862	54,547	23,039
Renfrew	2	265,961	76,613	....
Simcoe	2	68,000	19,140	....
Stormont	1	46,999	13,984	....
Victoria	6	547,784	153,480	....
Waterloo	5	983,449	276,287	....
Welland	3	282,830	80,472	....
Wellington	5	1,790,659	521,738	....
Wentworth	4	221,104	65,564	....
York	9	4,199,306	1,194,708	....
The Province.				
1915	151	24,566,430	6,928,923	277,847
1914	167	23,104,537	6,115,425	122,674
1913	155	20,629,555	5,318,435	290,637
1912	136	15,835,801	4,451,339	167,277
1911	120	13,738,203	3,268,303	....
1910	121	12,893,650	3,016,135	....
1909	97	9,015,206	2,175,955	....

*Not reported under this head in this county in 1914.

PART II.—CHATTEL MORTGAGES.

Table showing by County Municipalities of Ontario the total number and amount of Chattel Mortgages on record and undischarged on December 31st, 1915, against (1) all occupations; (2) farmers; together with totals for the Province for the past five years.

Counties and Districts.	Chattel mortgages against all occupations.				Chattel mortgages against farmers.			
	To secure existing debt.		For future indorsation.		To secure existing debt.		For future indorsation.	
	No.	Amount.	No.	Amount.	No.	Amount.	No	Amount
		$		$		$		$
Algoma	227	239,573	....	....	105	29,611	..	....
Brant	208	168,467	....	....	63	49,400	..	....
Bruce	252	133,223	7	1,794	160	65,911	7	1,794
Carleton	311	328,301	6	4,736	51	30,642	..	....
Dufferin	69	39,369	....	....	35	14,721	..	....
Elgin	288	259,062	....	....	138	73,530	..	....
Essex	336	165,716	....	....	195	59,142	..	....
Frontenac	290	196,857	....	....	206	91,321	..	....
Grey	439	245,947	....	....	250	137,693	..	....
Haldimand	97	63,489	....	....	46	23,678	..	....
Haliburton	54	12,057	....	....	35	6,466	..	....
Halton	77	62,758	....	....	39	31,273	..	....
Hastings	497	247,072	....	....	275	126,102	..	....
Huron	163	198,858	....	....	85	89,453	..	....
Kenora	57	†415,605	....	....	10	4,966	..	....
Kent	449	179,672	....	....	321	144,150	..	....
Lambton	324	175,416	....	....	127	67,510	..	....
Lanark	122	115,447	4	3,530	68	44,949	2	1,450
Leeds and Grenville	257	179,592	...	....	153	103,472	..	....
Lennox and Addington	151	80,796	1	300	87	48,760	1	300
Lincoln	134	115,510	1	(a)150.000	32	14,198	..	....
Manitoulin	119	36.708	....	....	93	17,468	..	....
Middlesex	240	513,722	1	10,000	79	51,771	..	....
Muskoka	209	79,711	2	17,380	74	25,095	..	....
Nipissing	255	245,723	1	300	119	36,784	..	....
Norfolk	155	115,041	....	....	99	55,232	..	....
Northumberland & Dur.	331	257,293	....	....	210	128,769	..	....
Ontario	197	154,517	2	30,000	101	47,467	..	....
Oxford	232	484,384	....	....	118	82,685	..	....
Parry Sound	215	316,606	....	....	68	13,804	..	....
Peel	48	24,868	....	....	32	13,679	..	....
Perth	116	117,663	....	....	47	40,974	..	....
Peterborough	186	279,110	....	....	96	39,558	..	....
Prescott and Russell	174	282,762	....	....	106	53,280	..	....
Prince Edward	93	75,850	....	....	60	49,047	..	....
Rainy River	89	54,901	....	....	31	17,505	..	....
Renfrew	188	104,505	....	....	113	38,094	1	112
Simcoe	480	263,922	....	....	326	140,958	..	....
Stormont, Dun. & Glen.	235	146,353	7	3,214	147	98,360	3	400
Sudbury	300	189,130	....	....	145	53,831	..	....
Thunder Bay	188	*1,172,566	2	2,538	71	18,097	..	....
Timiskaming	395	253,921	2	43,107	174	53,531	..	....
Victoria	99	67,033	1	9,000	64	36,860	..	....
Waterloo	156	500,041	1	405	29	32,430	..	....
Welland	200	368,077	4	6,800	57	19,502	..	....
Wellington	158	130,436	....	....	66	41,734	..	....
Wentworth	503	491,299	3	(b)400,000	64	53,704	..	....
York	1,647	2,083,851	4	16,838	108	62,136	..	....
The Province								
1915	12,010	12,432,780	49	699,942	5,178	2,579,303	14	4,056
1914	10,881	28,164,771	60	6,365,509	4,791	2,444,406	16	17,627
1913	10,190	32,442,616	49	8,485,788	4,831	2,279,301	16	4,012
1912	10,654	39,406,857	55	542,235	5,016	2,310,071	6	3,489
1911	11,261	40,698,959	74	1,492,161	5,482	2,624,057	14	7,860
1910	12,490	31,108,900	80	1,101,014	6,196	2,658,283	18	8,258

(a) Including 1 paper Company for $150,000; (b) Including 3 Manufacturers for $400.000. † Including 3 Lumbermen for $237,278. * Including 1 Mortgage Company for $973,400.

THIRTY-SIXTH ANNUAL REPORT

OF THE

Beekeepers' Association

OF THE

PROVINCE OF ONTARIO

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1916

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TORONTO

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

Lieutenant Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Thirty-sixth Annual Report of the Ontario Beekeepers' Association for 1915.

JAMES S. DUFF,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,
TORONTO, 1916.

Ontario Beekeepers' Association

OFFICERS FOR 1916.

President—F. W. Krouse, Guelph.
1st Vice-President—Jas. Armstrong, Selkirk, Rt. 1.
2nd Vice-President—W. W. Webster, Little Britain.
Secretary-Treasurer—Morley Pettit, O.A.C., Guelph.

Directors—District No. 1, R. E. L. Harkness, Iroquois; District No. 2, A. McTavish, Carleton Place; District No. 3, M. B. Holmes, Athens; District No. 4, R. Lowey, Woodrows; District No. 5, W. W. Webster, Little Britain; District No. 6, J. L. Byer, Markham; District No. 7, F. W. Krouse, Guelph; District No. 8, Jas. Armstrong, Selkirk, Rt. 1; District No. 9, John Newton, Thamesford; District No. 10, Jacob Haberer, Zurich; District No. 11, C. E. Chrysler, Chatham, Rt. 5; District No. 12, Denis Nolan, Newton Robinson; Ontario Agricultural College, Morley Pettit, Guelph.

Committees:

Revising Committee—Mr. Sibbald, Mr. Pettit.
Honey Crop Committee—Mr. Couse, Mr. Craig, Mr. Sibbald.
Representatives to Horticultural Exhibition—Mr. Couse, Mr. Grainger, Mr. Sibbald, and the Secretary.
Transportation Committee—J. D. Evans, the President and the Secretary.

Representatives to Fair Boards:

Representative for Toronto Exhibition—J. D. Evans, Islington.
Representative for Ottawa Exhibition—M. B. Holmes, Athens, and the President.
Representative for London Exhibition—E. T. Bainard, Lambeth.

Treasurer's Report

For the Year Ending October, 30th, 1915.

Receipts.		Expenditures.	
Balance on hand, 1914	$52 16	Grants to Associations	$288 86
Membership fees	984 25	Expenses, Convention	257 50
Queen Order receipts	1,261 60	Expenses, O. B. A. Committee	68 75
Affiliated Societies' dues	155 00	Subscriptions, "The Beekeeper"	876 38
Ontario Government grant	700 00	Printing and postage	212 64
Honey sales receipts	78 61	Queen Order payments	1,189 68
Sundries	16 89	Office help	76 20
		Office supplies	47 62
		Incidentals	6 96
		Balance on hand	223 92
	$3,248 51		$3,248 51

Examined and found correct,
this 15th day of November, 1915.
D. F. Cashman,
Auditor.

J. L. Byer,
President.
Morley Pettit,
Secretary-Treasurer.

Ontario Beekeepers' Association

The thirty-sixth annual meeting of the Ontario Beekeepers' Association was held at the Carls-Rite Hotel, Toronto, on the 23rd, 24th, and 25th November, 1915.

About 200 beekeepers were in attendance from all parts of Ontario.

The President, Mr. J. L. Byer, occupied the chair.

PRESIDENT'S ADDRESS.

J. L. Byer, Markham.

Since meeting together here a year ago in convention assembled, another season has passed, bringing with it the usual varied experiences in the way of pleasures and sorrows, realizations and disappointments. And while, no doubt, it is true that the lot of some has been more fortunate than that of others in the matter of things temporal, yet I venture to say that there is no one of us but who will feel like devoutly thanking Almighty God that things are as well with us as they are, if we but for a moment think of the awful misery confronting hundreds of thousands of poor unfortunates dying, or at best existing, in the portions of Europe and Asia now being devastated by the terrible war in which most of the nations of the world are now engaged.

During the year just passed the grim reaper has been in our midst and some of our beekeeping friends have passed to the great beyond. Prominently amongst these stands the name of J. K. Darling, of Almonte, a gentleman well known to a great many of us, a man of sterling qualities and Christian demeanor, and a past-president of our Association.

The winter of 1914-15 was disastrous to the bees in some sections and particularly so in apiaries where little or no fall feeding was done. Inferior stores gathered from hard maple the previous season seems to have been the cause of most of the loss, as in every case under my notice where heavy feeding had been done the bees wintered well. Our Secretary estimated that some sections lost as high as from fifty to seventy-five per cent., and while this may have been true in a few isolated cases, careful inquiry convinces me that very few of the men who produce honey as a main line in their business, had very heavy losses; and personally, after taking this thought into consideration, I would be inclined to say that losses last winter were little above the average.

The crop of honey was good from Toronto west, and light from that point east. No doubt there are some exceptions to this, but in the main this estimate will be found to be about right. Unfortunately for us personally our York County apiaries were east of the line dividing the land of good crops from the land of medium to very light ones. Northern Ontario, in the main, gave a very fair crop of honey of No. 1 sample.

Contrary to general expectations on the part of the beekeepers, the demand for good honey has been exceptionally keen, and wherever any effort has been made to obtain prices recommended by the crop committee, the same has been received, generally speaking. True, some beekeepers got "panicky" early in season and sold for as low as eight cents, I am told. Needless to say they could have obtained at least two cents more per pound by holding for a few weeks—quite an item when the crop runs up to ten tons or more. Early in season the demand for buckwheat honey was very light—in fact many well known dealers would not quote any price. However, the situation is now better, and as the dark honey crop is not heavy, all honey of this grade should move off easily.

Our membership at present is 1,130. 426 came in through the affiliated associations and 604 by single subscriptions. County Associations are, I believe, the same in number as a year ago, viz., 26.

The *Beekeeper* has been given to each member as a premium as in former years—it will be for your executive for next year, to decide whether the same course will again be taken.

The disease situation has been, is at present, and is likely to be so in the future, a question of paramount importance to the beekeeping fraternity, and especially to the members of this Association who comprise the bulk of the main honey producers of the Province. From what I can learn, the situation might be briefly summed up like this: American Foul Brood, at least no more of it than in former years—possibly there is less of it as each year goes by. European Foul Brood gradually spreading—in fact "gradually" is hardly the word to use as this disease travels real fast in the majority of cases. I understand a new centre for the disease to radiate from has been discovered in Haldimand. The general report from beekeepers and inspectors alike, says that we have not enough money to properly fight these diseases; and the appropriations run out early in the season, and after that no matter how urgent the case, inspection is often an impossibility owing to lack of funds. While this is, no doubt, true, in view of the many appeals being made during these troublous times to private and public purse alike, it seems almost useless to try and obtain further grants until conditions become more normal again. Sometimes I have felt like saying with others, "Let the disease go and let the problem be worked out on the principle of the survival of the fittest," but even if we did incline to sympathize with this rather selfish view, the fact remains that during the sifting out process, the unfit will cause a big loss and a pile of work to the fittest. The only thing left is to do the very best we can with the funds at our disposal, and as emphasized a year ago, try in every means possible to educate every beekeeper to be his own inspector.

Bear this in mind. Under existing provisions as we have them, early requests have the preference. so if you have urgent cases near you that need attention notify the Department through Mr. Pettit early in the season.

I understand that during the past season the inspectors were authorized to stop at a diseased apiary and treat the colonies, provided the apiarist paid for this extra work at forty cents an hour. The trouble was that in some cases the beekeeper thought the Department should do all the work gratis. Just how much of this work was done I am not in a position to say, but it certainly does not look reasonable for the beekeeper to expect to have the bees all treated at the Department's expense. I would. therefore, suggest for your consideration that when a man refuses to treat the bees after being shown how the Department should then step in and treat them by the coal-oil method.

The queen order business has again been carried on with an increased patronage as compared with last year. This branch of the work appears to be giving a lot of satisfaction to all concerned, and to my mind it is a splendid method to get many to introduce better stock and thus be in a position to combat

European Foul Brood more effectively, to say nothing of the increased production of honey and other factors incidental to having Italians or Carniolans instead of black bees.

In regard to contributions of honey to the Red Cross Fund, an appeal was sent out that honey might be forwarded. I sometimes think it might have been better had it been sent under the auspices of the Ontario Beekeepers' Association. A quantity of honey has been sent to Toronto, and I know that from our own neighbourhood beekeepers have contributed honey through the Women's Institute. Some of our County Associations have sent contributions of honey.

As to the Horticultural Show, the different societies met this spring and decided that it would not be wise to hold a show this fall. One reason being that it was difficult to secure a suitable building.

We had an intimation from those in charge of the Canadian National Exhibition that the grant we received a year ago would not be given this year, and they asked us to prepare a prize list. That prize list was drawn up by our committee and adopted, and I am sorry that, owing to some misunderstanding with regard to the privilege of selling on the ground, only one exhibit was made, that was by Mr. George Laing.

The President, in conclusion, gave it as his opinion that the Provincial Apiarist was giving too much attention to elementary instruction at the College rather than engaging in the more advanced work that the Association had in mind when its members had urged the Government to establish such a department at Guelph. He expressed the fear that there was a tendency to boom beekeeping and induce too many inexperienced persons to rush into a calling which was not the quick-rich concern that they imagined.

In the discussion that ensued upon this point of the President's address, it was stated in reply that there was plenty of room for more beekeepers if their work was good, and that all classes engaged in the work of producing honey deserved encouragement—novice and experienced man alike. Apiarists, like general farmers, should have the best training possible for their work.

REPLY TO PRESIDENT'S ADDRESS.

F. W. Krouse, Esq., 1st Vice-President, Guelph.

The President mentioned the loss from hard maple honey. We should all look out for that. If any of you are in a district where you get much of that you should by all means see that it is out of the brood-nest before winter. If you have very much of it in the brood-nest you are almost sure to lose the colony of bees. We have quite a lot of hard maple in our district, and every colony that went into winter quarters with mostly hard maple honey died in the spring—not early, but later on. When I examined the hives, I found this honey granulated hard in the brood-nest. When I extracted this honey I noticed that it granulated very quickly. We left the extractor full of honey from Saturday night till Monday, and on Monday it was so thick that it would not run out.

We have had a fair crop in most places, and that is something for which we should be thankful after the very short crop we had last year. Although the crop was not as good as we expected from the indications in the spring and the amount of clover, yet we should be thankful for the crop we received because the weather conditions were bad.

Prices have been good. In my own case I received as good prices as I did a year ago. I have not had to lower the price, and I do not expect to. The dark honey did not sell as rapidly this year as usual. A number of men who have formerly bought dark honey did not buy it this year. One man to whom I have always sold dark honey wrote me that he did not want any. I had to find another market for my dark honey, and I sold it in Winnipeg. Mr. Pettit recommended me to a buyer out there. Since I have sold I have had one or two inquiries for dark honey.

Our membership has dropped off a little, but I think it has kept up fairly well under the conditions.

I think we are getting the upper hand of the American Foul Brood, at least we are in our district. The European Foul Brood is going to come to us sometime, and the proper thing to do is to be prepared and have our colonies Italianized. It has taken a new hold this year in Haldimand County, and no doubt it will spread all over in time.

Mr. F. P. Clare, Toronto: Would you kindly tell us how we are to know maple honey from clover honey?

Mr. Krouse: It is not as light as clover honey and comes in before the clover honey. It comes in quite early, in May. If you have a lot of that honey stored in the brood nest the best way is to work it in the brood or take it out and extract it. I was foolish enough to leave quite a lot in a year ago last summer. That seemed to be about the only honey I got. There was lots of it in my big hives, and I left it there.

Mr. C. Blake, Snow Road: I do not suppose there is much danger of that unless we have a short season?

Mr. F. W. Krouse, Guelph: No. A year ago we had no clover honey in our district.

REPLY TO PRESIDENT'S ADDRESS.

James Armstrong, 2nd Vice-President, Selkirk, Ont.

We have been trying for several years to get something done to protect beekeepers from bees that are shipped in from other countries. Bees are brought in from New York State, and we have been getting them for quite a number of years. I have been expecting some disease to come in that way and we struck it this summer. We have European Foul Brood very bad in some places. I think it is time that we stirred up the Dominion Government to do something in this regard. They should notify the Department at Guelph that there is a shipment of bees coming to John Smith, and that they are coming through at Fort Erie. The inspector of that district could be right on the job and give these bees a thorough inspection. If he found any disease he could destroy them at once or ship them back again. The way the law is at present we cannot stop them from coming in. Last fall this disease got in and we had several county meetings. The District Representative did the advertising and sent out the notices to the beekeepers, and we had three nice meetings in the County of Haldimand. We had an attendance of between twenty and thirty at each meeting, and more queens were bought after these meetings than ever before. All this work was done by the County Association and at no expense to the Government. I think it would be a good plan if every County Association would get to work and do something for themselves. I have been talking along this line for several years, that the beekeepers should try to help themselves first. If you have a neighbor who is not getting on well try and help him. At our annual meeting in October we talked this matter over thoroughly and there was not a member present who was not willing to pay a certain amount to be used in the county for the purpose of heading off disease and cleaning it up. We sent very little honey to the Red Cross from our County. I do not know of more than 100 lbs. which was sent. The request came after the honey was nearly all sold and they did not want buckwheat honey.

Mr. J. D. Evans, Islington: I have been trying to get some measure whereby bees coming into Canada can be inspected. We are now getting a lot of bees without combs—bees by the pound. I do not know how they are going to be inspected. I think there should be a very stringent regulation as to how these come into the country. I think the executive should endeavor to have legislation passed that we should have a thorough inspection of all bees coming into Canada. There is a law providing for the inspection of trees. This Act was passed because it was found that diseases were being brought into Canada on fruit and ornamental trees. Something of the same kind should be done with regard to bees. The trouble with our convention is that there is no place on the programme that will allow us to pass resolutions and get down to business and do something. I moved once before that the executive take certain action to have bees inspected, and if it is in order now I move again that the Executive of the Association be instructed to take such means as in their judgment is best to provide for the inspection of all bees imported into Canada. I greatly appreciated the address of the President.

Mr. J. F. Dunn, Ridgeway: I have much pleasure in seconding that motion. It touches on an important point. I think the safest way to get bees is to bring them in without combs, because I do not think there is much danger of infection when they are brought in in that way. I live near Niagara Falls, within nine miles of where all the bees come into this country. Nearly all the trouble we have had has come from the United States. If these bees could be inspected we would be saved all our trouble. I suppose this is a matter that will have to be handled by the Dominion Government and perhaps a strong resolution backed up by this convention may bring results. The bees that came over from the United States came from an area that was supposed to be cured of European Foul Brood by the introduction of Italian queens. I don't want to minimize the importance of Italian queens, because they are our only salvation, but a yard that has been cured of European Foul Brood by the introduction of Italian queens is not a safe yard to bring queens from. In a township not very far from where I live and where the European Foul Brood has never made its appearance, the people came from quite a large apiary state, and the bees were brought from the United States, and as far as Italian bees could do it they were clean, but the disease was there just the same, and it was not long because the country was filled up with black bees. The product ran down from 265 to 60 lbs. in one season. If we can secure this inspection I think we will get rid of a lot of trouble.

M. B. Holmes, Athens: The ground that has been taken by the previous speakers is good, but I was in hopes that they would touch on another feature in the protection of bees. There has been called to my attention during the last few months in the eastern counties, not my own county but further east. The party who complained to me had eighty-six colonies of bees, and his neighbors sprayed his grain for the extermination of mustard, and as a result he only had eleven colonies left out of eighty-six. Thirty-three colonies died within a week, absolutely. I was asked if there was any legislation by which such wholesale destruction of the property of a beekeeper can be prevented. It occurred to me that while this resolution was going through that fact might be noted, and legislation might be secured to prevent the destruction of bees in the manner I have described. I believe, if necessary, I could get sworn testimony to prove what I say. I am told that the party who did the spraying wished to sell his farm and was anxious to do the spraying, but he was rather fearful that it might injure his neighbor's property.

The Chairman: The Thursday afternoon session is devoted to Poisoned Sprays and Their Relation to Bees," and that might be a better time to bring this matter up. That would be a matter for the local Legislature.

Mr. Chas. Blake: Do not think you will get rid of European Foul Brood as soon as you get Italian bees. You have got to fight it continually from the spring until the fall. I found many hives this season scattered here and there in the hands of up-to-date beekeepers. They would say: "My hives are all clean but you will find some of the disease here and there." I believe it comes from the old-fashioned box hives that are being used by careless beekeepers. One man allowed his box hives to be cleaned out by his own bees and his neighbors' bees carried home the disease. I believe it would be well to prohibit bees from coming in from the United States altogether. I believe that is what has spread it from one end of the country to the other.

The Chairman: This is a resolution that should appeal to each and every one of us. I will repeat it: "That the Executive be asked to take action to have the Federal Government pass legislation forbidding the importation of bees into Canada until they have first been inspected at the border." Carried.

TEMPERATURE AND HUMIDITY IN THE HIVE IN WINTER.

Dr. E. F. Phillips, in Charge of Bee Culture Investigation, United States Department Agriculture, Washington, D.C.

Since the task of discussing the practical phases of outdoor wintering is assigned me for a later session it will be best to confine the discussion of the subject now assigned to the theoretical phases only, without attempting to apply them to the apiary conditions. My colleague, Mr. Geo. S. Demuth, and I have for the past three winters been interested in the conditions of the hive in winter. On this subject we published as a preliminary report Department Bulletin No. 93, "The Temperature of the Honey Bee Cluster in Winter," and recently published a practical discussion as Farmers' Bulletin No. 695, "Outdoor Wintering of Bees." Furthermore on several occasions I have discussed the subject now assigned and some of these papers have been published. This explanation is made to explain a partial repetition at this time, although probably not all present have had access to the papers mentioned. The problem is so important that repetition is excusable.

Canadian beekeepers, like their co-workers in the United States, are losing many colonies every winter. That the present heavy loss can be greatly reduced or even that, barring accidents to colonies, it can all be avoided is an inevitable conclusion. Our previous knowledge of wintering came from trials in the apiary, results obtained at enormous cost and without opportunity for constant observations of the bees. Furthermore this experience is transient since much of the good work is buried in bee journals and now forgotten by most beekeepers. It has, therefore, seemed time for a detailed study of these conditions.

THE SOURCE OF HEAT IN THE COLONY.

It is a well-known fact that bees generate heat during cold weather, so that the temperature of the cluster never drops very low. The lowest temperature that we have found is 57° F. In order to see what the bees do during this period of heat production, we devised a special outfit so that we coud see the inside of the cluster. A colony in winter forms a compact, approximately spherical cluster and on the outside of the cluster there is nothing that one can see that suggests the heavy heat production that must take place. However, a narrow hive was provided, with double glass sides and top, with an air space between the sheets of glass to act as an insulation. The stores were then so arranged that the only place available for the cluster was next to the glass on one side. In the outside space were placed a number of the electrical thermometers which we used and which are briefly described in Bulletin No. 93 of the Department of Agriculture, to which those interested are referred. In the space provided there was not room for a spherical cluster, so the bees formed a hemisphere, the equator of which was against the glass. This showed as a circle of bees on the glass, exposing to view the centre of the cluster.

It was then clearly demonstrated that the cluster is not uniformly compact. The cluster consists, between the combs and sometimes above and below them, of an outer shell of bees packed close together, with their heads towards the centre. The thickness of this ring varies with the weather being thicker when the outer temperature is warm and when less heat production is needed, and becoming thinner with the increase in heat production. This is because when more heat is produced more bees are needed for this work, leaving less for the outer rim.

In order to expose this colony (Colony C) to rapid changes in temperature, the hive was placed on the roof of the building, and while one person watched the bees another read the temperatures in the room below where the instruments were located. A telephone was installed, so that the two persons could be in constant communication, head pieces being used, so that the hands of both observers were free. The observations made on the roof were then given over the telephone and all records were made below. This colony was of course in the light, but the normal cluster was nevertheless observed. The colony was disturbed as little as possible during the observations to eliminate abnormal conditions.

The nearly spherical cluster of bees consists, between the combs and sometimes above or below them, of an outer shell of bees close together, with their heads towards the centre. This ring may be several layers thick. The position with the heads inward is typical, except when condensed moisture drops on the cluster, as it often does in cool weather, when the bees at the top turn so that their heads are upward. The bees in this outer shell are quiet, except for an occasional shifting of position. Inside this rather definite shell the bees between the combs are not so close together, nor are they headed in any one way. Considerable movement, such as walking, moving the abdomen from side to side, and rapid fanning of the wings, takes place inside the sphere, and when a bee becomes unusually active the adjoining bees move away, leaving an open space in which it can move freely. Two bees may often be seen tugging at each other. In addition to the bees between the combs, placed as above described, others are in empty cells of the comb on which the cluster is always formed, always with their heads in. A verification of these statements is contained in the following observations, and the experiment may easily be repeated by anyone: For the purpose of obtaining a colony without combs for another experiment, a hive was opened December 15, 1913, while the outside temperature was low enough to cause the formation of a compact cluster. When the combs were separated the circle of bees in the shell was clearly observed. When a comb from the centre of the cluster was shaken the active bees in the centre of the circle dropped off readily, and those in the outer shell which were somewhat sluggish were removed with more difficulty. After this was done, those occupying empty cells in the centre of the sphere backed out of the cells and were shaken off. Finally those occupying cells in the border of the sphere backed out, showing a well-marked circle on the combs. Evidently the bees in the shell, whether in the cells or between the combs, are less active than those in the interior of the cluster. Naturally such a manipulation as this is not to be recommended, except for purposes of demonstration.

It is clear from observations previously recorded that the highest temperatures are those of points in the centre of this shell, and this is to be expected, as the heat is generated here. The outer shell constitutes an ideal insulator for the conservation of the heat, since the bees arranged so close together form small dead air spaces in their interlacing hairs, especially those of the thorax, and afford still more insulation with their bodies. The abdomens of the bees in the outer row are practically separate one from another, and must often be exposed to severe cold. That this method of conserving heat is effective is shown by observations on undisturbed colonies out of doors. For example, on January 14, 1914, there was at 9 a.m. a difference of 68° F. between thermometers 14 (centre of the sphere) and 16 (outside the cluster) of Colony D, which were less than 4½ inches apart on the same level in the same space between combs, and a difference of 75° F. between this couple and the bottom board 4¼ inches below it. What this difference might sometimes be in colder climates may be imagined. Examples of this kind might be multiplied indefinitely from the records of these experiments.

The source of the heat of the cluster must, of course, be the oxidation of the food consumed by the bees. The bee is classed as a cold-blooded animal, in that the temperature of the individual bee is practically that of the surrounding medium. There is obviously, from the records just given, no internal regulation of the temperature of the body, such as is found in birds and mammals, for the temperature of a broodless cluster varies greatly. From the observations made on the various colonies, especially Colony C, it is clear that heat for the warming of the cluster is produced by muscular activity. While, of course, some heat is doubtless liberated by other life processes, this is practically negligible when bees are quiet, as in Colony A, when above 57° F. That higher temperatures may be produced greatly increased muscular activity is required, and in Colony C in cold weather bees in the centre of the shell of insulating bees were seen fanning vigorously and executing other movements, such as shaking and rapid respiration. We thus have the paradoxical condition that bees fan to heat the cluster in winter as well as to cool the hive in summer. Observations of this kind were repeated beyond number, and this theory of the method of heat production is entirely supported by the repeated observation of a humming noise from the cluster during cold weather.

A few details of the observations on Colony C may be of interest. For example, one bee was observed fanning vigorously for 7½ minutes (9.53 to 10.01½ a.m., January 23), while the other bees kept a space cleared for it. The temperature of the nearest thermometer rose 1½° F. during this time. At 9.52 this thermometer was almost a degree cooler that at the time of greatest heat during the fanning. The rapidity of fanning of the wings varied, and toward the end of the time it became so slow that the outline of the wings was distinguishable. After the excessive activity this bee stood in the same place for a time. Rapid respiration may play a more important part in heat production that at first appears. One bee was observed to breathe 21 times in 14 seconds and then cease the rapid respiration. On other occasions 50 or more bees would begin shaking their bodies from side to side.

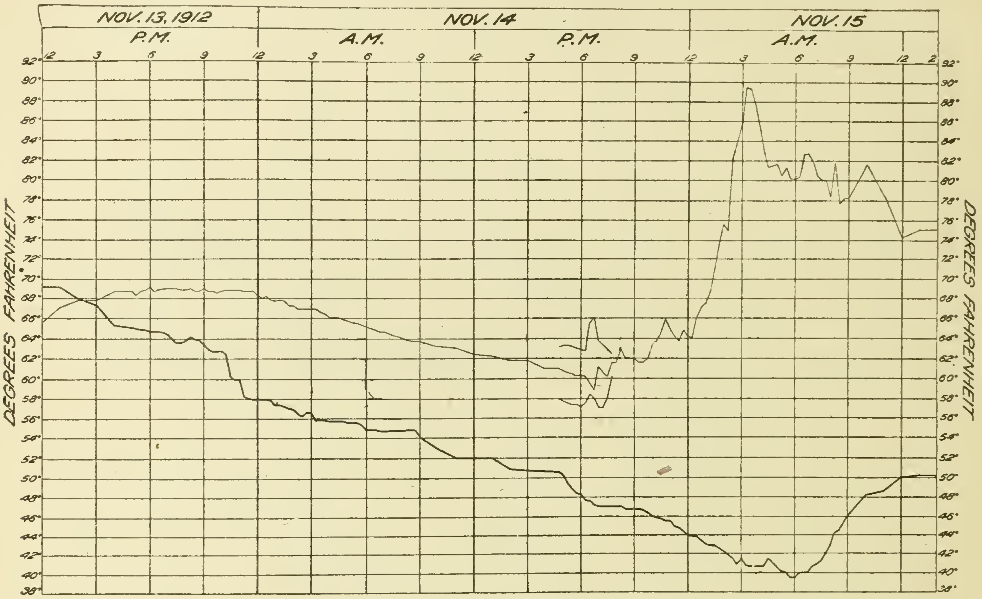
THE EFFECT OF CHANGES IN EXTERNAL TEMPERATURE ON THE HEAT PRODUCTION.

Another colony (Colony A) was used during the winter of 1912-13 to determine the responses of a normal colony to changes in outer temperature. It also was located on the roof, where the bees were free to fly whenever the weather permitted, and where it was exposed to rapid changes in temperature. It was in a 10-frame Langstroth hive, the entrance being reduced to ⅜ inches deep and eight inches wide, and the colony was not packed or given additional protection. In this hive we placed nineteen electrical thermometers, three on the bottom board in a row down the centre, one in each upper corner and twelve among the combs, distributed in such a way that the cluster could never get away from all of them. Readings were made hourly from 9 a.m. to 4 p.m. through the entire period of observation (September 26 to March 28), except Sundays and holidays, and at intervals additional special series of readings were made every 15 minutes (sometimes every 30 minutes) during the night (5 p.m. to 8.45 a.m.) for periods of several days each. In all 41,413 records were made of temperatures in Colony A.

The reaction of the cluster in heat production, as induced by changes in external temperature is well shown by the records made from noon November 13 to 2 p.m. November 15 (1912), when readings were made hourly from 9 a.m. to 4 p.m. and every 15 minutes at night. From noon on November 13 the outside temperature dropped slowly until 6 a.m., November 15, and the weather was cloudy, so that the bees did not fly. At noon on the 13th the outside temperature was about 69.2° F. and all the points within the hive were then cooler than the outside air, due to the fact that it took some time for the inside of the hive to warm up. At 4 p.m. the outside temperature had dropped to 65.3° F., when it was lower than any of the points within the cluster, which had in the meantime become warmer. From this time until 6 p.m. the next day (14th) the temperature within the cluster gradually dropped as the outer air cooled, until the lowest one (No. 9) was 57° F. (Outside temperature, 48.2° F.). The generation of heat began at 6.15 p.m. at this point, which was to one side of the cluster, and is to be attributed to the movement of the bees in forming a definite cluster. At 6.30 p.m. a rise in temperature was noticed on thermometer 19, at the other side of the cluster. Until 10.15 p.m. the changes in temperature are probably to be interpreted as incidental to the formation of a compact cluster, and from this time until the next day at the close of the series of readings thermometers within the cluster showed a considerably higher temperature than the outer air, or than the thermometers outside the cluster. The maximum in this series was reached at 3.15 a.m. November 15, when thermometer 12 in the centre of the cluster registered over 89.4° F.

After the coldest outside temperature was reached and the outer air began to get warmer (6.15 a.m., November 15), there was a tendency for the cluster temperature to drop. This is somewhat noticeable in the case now being discussed, and is more clearly seen in the records obtained in other series. In general, after a period of cold, when the outside temperature begins to rise, the cluster temperatures drop slowly to meet the outside temperature. The generation of heat is reduced, or even discontinued, only to be increased when the outside temperature again drops, or when it gets high enough to induce greater activity, as in flight. It is found also by taking more frequent readings when the cluster temperature is above about 69°F. that it is less constant than when it is below this temperature, indicating that at temperatures above this point the bees move about to some extent, while between 57° and 69° they are quiet, unless flight is desirable owing to a long confinement.

This series of readings is supported by numerous records taken on this and other colonies throughout the winter, and, since all the observations tend to confirm what was first seen on the record presented here, we feel justified in presenting a definite statement of the reactions of the cluster to outside temperature. It may be added that a careful study of the records of previous investigators fails to show a similar statement on this subject. When a colony is without brood, if the bees do not fly and are not disturbed and if the temperature does not go too high, the bees generate practically no heat until the coolest point among the bees reaches a temperature of about 57° F. At temperatures above 57° F. a compact cluster is not formed, but the bees are widely distributed over the combs. At the lower critical temperature, which is for the present stated at 57° F., the bees begin to form a compact cluster, and if the temperature of the air surrounding them continues to drop they begin to generate heat within the cluster, often reaching temperatures considerably higher than those at which they were formerly quiet and satisfied. It is evident, therefore, that the temperature within the cluster is far from being uniform in winter, as has been, in a sense, assumed among practical beekeepers. At the temperature at which other insects become less active (begin hibernation), the honey bee becomes more active and generates heat, in some cases until the temperature within the cluster is as high as that of the brood nest in summer. To sum up, when the temperature of a colony of undisturbed broodless bees is above 57°F. and



The outdoor temperature and temperature of the centre of the cluster of bees in colony A from noon, November 13th, to 2 p.m. November 15th. Outdoor temperatures are indicated by the heavy line. Short lines show temperatures of couples on the outer edge of the cluster at the time of first heat production.

below 69° F. the bees are quiet and their temperature drifts with the outer temperature; at lower temperatures they form a compact cluster, and the temperature within it is raised by heat generated by the bees.

We desire to state that while the lower critical point, 57° F., appears rather well established, the observations up to the present do not justify too definite a statement concerning the upper limit of quiescence. It must be emphasized that these conditions do not apply when the colony has brood. The rearing of brood in winter causes a marked increase in heat production and constitutes a condition which may become one of the most disastrous that can befall a confined colony.

When the heat production of the colony is explained, we are able to understand to some extent the divergence in the records obtained by other observers. It has, of course, long been known that bees generate heat, and it has been pointed out that during cold weather the temperature of the cluster is often higher than during warmer weather. While the temperatures previously recorded are in most cases abnormal, due to disturbance, the chief difficulty in understanding the phenomena which takes place is due to insufficient observations. For example, if between noon November 13 and 2 p.m. on November 15 only a half dozen temperature records had been made for the cluster (and perhaps without finding the warmest part of it) and the outside air, it would have been impossible to determine the limits of heat production. Most observers have been satisfied with a few observations, and seemingly everyone who has inserted a thermometer in a hive has felt called upon to publish the results, thereby only confusing the problem.

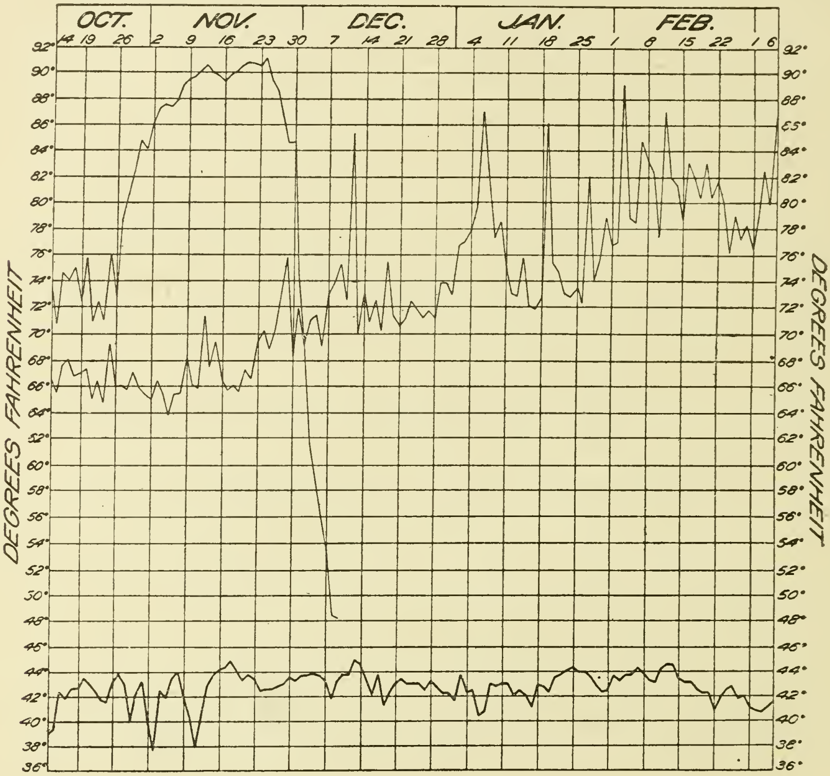
The Effect of Confinement and the Accumulation of Feces.

Before beginning a discussion of the effect of confinement and the accumulation of feces, it may be recalled that during the active summer season the length of life of worker bees is in a sense determined by the work done by them rather than by days or weeks. The greater the necessity for excessive activity the shorter the term of life. We believe that they have evidence to prove that this applies to the winter also, and this belief is entirely supported by the experience of beekeepers everywhere. That bees may come out of winter quarters strong in numbers and vitality, it follows that the work to be done by the bees in the winter should be reduced to a minimum; and the winter problem, as thus interpreted, is therefore to find the conditions under which broodless bees do the least work. The work which broodless bees do in winter consists, so far as has been determined, solely in the production of heat or in activity incident to flying on warm days (if free to fly), and therefore the problem, so far as it is under the control of the beekeeper, is primarily to obviate the necessity for the production of heat. If brood is reared the work of the bees is necessarily enormously increased, and their vitality is correspondingly decreased. So far as evidence is available in our work, the colony is not fully recompensed for this expenditure of energy by an increase in the strength of the colony by bees thus reared.

The colonies to be discussed under this heading (Nos. 1 and 3) were wintered in a constant-temperature room of the University of Pennsylvania, Philadelphia, Pennsylvania, in special 6-frame hives (to economize space and concentrate the colony so that fewer thermometers would be required) with full entrances and were not propolized or sealed at the top. During the regular series of readings the room was kept at a temperature which rarely dropped below 40° F. or went above 45°F., and the average temperature from October 14 to March 6 was 42.67° F. This temperature was chosen as being nearly the one usually considered the best by beekeepers. The foods given these colonies were stored in the combs, just as placed by the bees. There was some pollen available in colony No. 1. On this colony, 24,077 temperature readings were taken.

According to what has been said in the previous section, we should expect bees at such a temperature to maintain a compact cluster and to generate some heat at all times. This was actually the case, the temperature of the interior of the clusters dropping below 64° F. only a few times in either colony.

Colony No. 1, on honey stores, was in the constant-temperature room from October 12, 1912, to March 24, 1913, or 163 days. It was then removed for a flight and put back the same evening, where it remained until March 28. From March 7 at 9 a.m. until March 28 at 4 p.m. readings were made in this colony every 15 minutes night and day, with the exception of the period between 9 a.m. and 7 p.m. on the 24th, when it was out of doors. During this period of three weeks the temperature of the room was changed slowly, being raised as high as 64° F. and cooled to 13° F.



Average daily temperatures of the centre of the cluster of bees in colonies 1 and 3, and room temperatures, October 14th, 1912, to March 6th, 1913. Taken from readings made hourly from 9 a.m. to 4 p.m. The room temperatures are indicated by the heavy line.

When this colony was first placed in the room for the regular series of readings, after a preliminary confinement, October 12 (the readings were begun Monday, October 14), it maintained a cluster temperature which usually lay between 64° and 68° F., the daily average temperature departing from these rather narrow limits only four times up to November 22. The average temperature is 66.5° F.

During the first five weeks the temperature of the room was less regular than later (due to faulty working of the regulating apparatus), and this doubtless accounts for some irregularities n the cluster temperature. At first the three thermometers in the cluster (1, 2, and 5) gave temperature readings quite close together, while thermometer 6, which was near the cluster, gave readings intermediate between the three thermometers of the cluster and the four others in the hive, farther from the cluster. After November 22 the records of the thermometers in the cluster were more widely separated and the temperature of the centre of the cluster (shown on thermometer 5) tended to rise gradually. It varied constantly, but by December 7 and from then until the end of the month, it averaged between 69° and 75° F. On November 29 and December 12 the cluster temperature rose to over 88° F. From the 1st of January until March 6, which ended the regular series of readings, the cluster temperature became more and more irregular, and on January 20 the cluster moved (probably to accommodate itself to the stores) until thermometer 2 was nearer the centre and showed a higher temperature than thermometer 5. The size of the cluster was gradually decreased by the death of the bees, and all the thermometers except 2 and 6 show a gradual decrease in temperature until finally, from about February 25 to March 6, they are all low and of nearly equal temperature. The two thermometers giving high readings continued to show in general a higher and higher average temperature and to become more irregular (except from February 15 to March 1), the periods of increased heat becoming more frequent. There was absolutely no regularity in these intervals. After February 1 the temperature of the cluster varied between 75° and 91° F., the average from February 1 being 85.4° F.

On March 6 all colonies in the constant-temperature room except two were removed. The colony described above (No. 1) and one other (No. 12), not to be described at present, were left. On March 7 at 9 a.m. the temperature of the room stood at 42° F., and the temperature of the interior of the cluster was about 84° F. The brine which cooled the room was then shut off and the temperature of the room rose very slowly and regularly, until on March 11 at 8.45 a.m. it was 64° F. For the first day the temperature of the cluster was slightly variable, and at 10.45 p.m. thermometer 6, which had been cooler than thermometer 2, showed a rise in temperature (probably due to a shifting of the cluster), and from then on to the 24th they were nearly of the same temperature at all times. On March 8, at 3 a.m., thermometer 2 rose to 87° F. (room temperature 48.5° F.), having previously shown a cooling. The cluster temperature then dropped slightly, showing relatively little variation until at 4.15 p.m., March 9, it stood at 77.3° F. (room temperature 55.7° F.). As the room temperature continued to rise, the cluster temperature increased still more rapidly, until at 8.15 a.m., March 11, it reached 93° F. (room temperature, 64.2° F.). A little brine was now turned on, sufficient to lower the temperature gradually to 58° F. at 9 a.m., March 12, and it again rose to 63.3° at 5.45 p.m., March 15. During this period the cluster temperature followed the room temperature, but remained constantly over 20° warmer. The room was again cooled slowly, and the cluster temperature dropped until on March 16, at 3 p.m., the room was 49° F and the cluster 77.5° F. As the room continued to cool, the cluster temperature increased, the bees responding to the colder temperature, until at 4.15 a.m., March 17, the room was 48° F. and the cluster 88° F. The room then gradually warmed, and again the temperature of the cluster dropped and then again rose with the room temperature, remaining always over 20° warmer. At 6.45 p.m., March 19, the brine was turned on full and the room cooled rapidly, reaching the minimum of 13° F. at 9 p.m., March

20. At no time, however, did any of the thermometers in the hive record a temperature below 33° F. Here it remained constant within 0.1° F. for about six hours, during which time the cluster temperature varied between 86.5° and 89.5° F. (a difference between the room and the cluster temperature of 73° to 76° F.). The brine was now shut off and the room again warmed until 9 a.m., March 24, when it reached a temperature of 44.5° F. During this warming the cluster cooled until at the close it was varying between 72° and 79° F.

As stated above, the colony was now (9 a.m., March 24) removed for a flight and put back the same day at 7 p.m. In the meantime the room was cooled to 33° F. When the bees were put back into the room the temperature of the entire inside of the hive showed great variation and naturally an increase due to the warming up while out of doors and to the activities of a good flight. The points outside the cluster dropped rapidly, but it was midnight, March 25 (31 hours), before the curves of the temperature again appeared normal. The room was slowly warmed to 63.2° F. at 6.30 p.m., March 26, and then slightly cooled to 54° F. at 6 a.m., March 27, and again warmed to 58.5° at the close of the series, 4 p.m., March 28. After the flight the temperature of the cluster never dropped below 89.5° F., and the highest temperature reached was over 95° F. (soon after the flight). Thermometer 6 remained high, but thermometer 2, which had previously been high, now approached the other thermometers, probably due to a rapid loss of bees and to a decrease in the number of bees during flight. It must be recalled that these bees had been confined for an abnormally long time and were subjected to treatment which is at least unusual. After this colony was taken from the room for the last time it was found that thermometer 6 was over a patch of larvæ, and, estimating as accurately as possible, the eggs from which these hatched must have been laid at the time when the room was coldest (March 20-21) and when the cluster temperature was at the highest point. There had been no brood previously according to the temperature records as compared with those of this colony earlier and with those of other colonies, nor was there much evidence of increased heat production due to the presence of brood until after the flight. Probably no extra heat was produced for the eggs, and possibly the hatching of the eggs was somewhat delayed by the low outer temperature. The effects on the cluster temperature which might be expected from a flight, in relieving the accumulation of feces, were not observed, because brood rearing had been begun.

Colony 3 was placed in the constant temperature room October 12, 1912, after a good flight, and readings were begun on Monday, the 14th. In all, 2,165 temperature records were made on Colony 3. The stores provided this colony consisted of honeydew honey, which was gathered in the department apiary and which, since it granulated almost at once, had been removed by melting up the combs which contained it. After this operation it remained liquid. During the summer of 1912 some of this honeydew honey was fed to a colony in the open, during a dearth of nectar, and was stored in new combs above the brood chamber, in which no cells of pollen were to be found. After the second storing the honeydew honey was clear, well ripened, and did not granulate. This colony was also in a six-frame hive, as previously described, and contained five thermometers (Nos. 14-18) among the combs. It is of course well known to beekeepers that honeydew honey is not a good food for winter.

When this colony was first put into the constant temperature room it behaved much as did colony No. 1, except that the temperature varied between 69° and 78.7° F. for the first week, being slightly higher and more variable than that of Colony No. 1. The second week it remained much the same, the temperature, however, varying between 69° and 80° F. From this time on the temperature of the centre of the cluster rose rapidly, never dropping below 79° F. From October 29 almost to the close of the readings. After November 4 the temperature remained above 86° F., and after November 11 it dropped below 89° F., only twice until the end. Thermometer 17 at first read about 4° below thermometer 14, but after November 11 they were close together until November 25, when thermometer 17 began to cool rapidly, due to loss of bees, and after November 30 thermometer 14 cooled rapidly until, on December 9, it showed that no more bees remained alive. From December 2 to 7, inclusive, there was little heat generated, due to the scarcity of bees. It is of interest to observe the records of thermometer 16, near the cluster, but usually outside of it. It at first showed a temperature but little higher than the two thermometers away from the cluster, but on October 31 it began to rise until, on November 12, it reached 80.5° F., when it was doubtless covered by the bees. Even the two thermometers (15 and 18) clear to the back of the hive rose until, on November 13, they recorded 61.5° F. These thermometers showed about the same temperature for about ten days, and then these two and thermometer 16 showed a cooling, since the bees were dying so fast that there were no longer enough to warm up these thermometers away from the centre of activity. It was to be expected that this colony would die, and the experiment was performed to learn the phenomena incident to the loss.

Before summing up the results of these two colonies, Nos. 1 and 3, it may be stated that, so far as the evidence here presented is concerned, the results as far as here discussed are confirmed by records from ten other colonies kept in the constant temperature room, but fed other foods and otherwise different. There is in all of the records no evidence which we can interpret as at all contrary to the views here stated.

It is evident from the behavior of Colony No. 1 that at least one factor entered which gradually caused the bees in the cluster to generate more and more heat until at the beginning of the special series, March 7, the cluster temperature was about 20° warmer than it was at the same room temperature at the beginning of the confinement. It is also seen that during the special series, March 7-24, the cluster temperature always remained at least 20° above the room temperature, whereas from the discussion of bees unconfined (Colony A) we might expect them to cease heat generation when above the lower critical temperature (57° F.). In the case of colony 3, fed on honeydew honey stores, the factor which caused more heat to be produced evidently increased much more rapidly. As stated previously, honeydew honey is a poor food for winter and is so recognized. It contains the same sugars as honey, but contains in addition a considerable amount of dextrin, the particular lot fed in colony 3 containing 4.55 per cent., while good honeys contain only a fraction of 1 per cent. From the evidence at hand it appears that dextrin can not be digested by bees and, whether or not this is the explanation, honeydew honey causes a rapid accumulation of feces which usually results in the condition known as dysentery, in bad cases of which the feces are voided in the hive. In the case of colony 3 the whole hive inside and out, as well as the frames and combs, were spotted badly, the inside of the hive being practically covered. Even with fine honey stores such a spotting is usually noticed after a prolonged confinement, especially in severe weather (or during brood rearing). It therefore appears that the accumulation of feces acts as an irritant, causing the bees to become more active and consequently to maintain a higher temperature. We are therefore justified in believing that the cause of poor wintering on honeydew honey is due to excessive activity, resulting in the bees wearing themselves out and ultimately in the death of the colony. In the case of colonies on good stores the feces accumulate more slowly and the excess activity is not so marked and is induced more gradually. The accumulation of feces due to confinement causes increased activity and this in turn is the cause of excessive heat production, resulting in a reduction in the vitality of the bees.

It therefore follows that excessive activity causes the consumption of more food, resulting in turn in more feces, so that colonies on poor stores are travelling in a vicious circle, which, if the feces cannot be discharged, results in the death of the colony.

While the activity of the cluster is greater at some times than at others, there are not, as has been held, regular intervals of activity at which the colony rouses itself to take food. At no time is a colony kept at a room temperature of 45° F. or less in a condition which can be characterized as inactive. Presumably the reported "intervals of activity" have occurred when the colony made a noise due to disturbance by the beekeeper.

The bees in Colony 3 were compelled to work constantly to maintain so high a cluster temperature. In fact, they did more work than colonies wintered in the open air. Keeping these bees in a cellar protected them from low outside temperatures, but the lack of opportunity for a normal ejection of feces caused a condition more serious than extreme cold weather. We seem to have here an explanation of the fact, often observed by beekeepers, that some colonies wintered in the cellar are in worse condition in the spring than colonies that are exposed to severe cold. Poor food is evidently a more serious handicap than low temperature.

HUMIDITY IN WINTER.

This subject is one concerning which less definite information is available, although it is one which has been much discussed by beekeepers. One of the chief difficulties seems to be a lack of information concerning the interrelationship of temperature and relative humidity, and it may be well to make some of these points clear.

THE SOURCE OF MOISTURE IN THE HIVE.

All northern beekeepers know that under some conditions, especially in the cellar, the atmosphere in the hive in winter may become so laden with moisture that it cannot all remain in the form of water vapor but condenses on the hive and combs. Water may even run from the hive during the winter confinement. Obviously this moisture does not come from outside the hive for this often occurs when the cellar appears dry.

Within the hive the only source of moisture is the food consumed by the bees. Honey not only contains about 20 per cent. water but when the sugars are consumed and assimilated the final products are carbon dioxide and water. Honeys vary in composition but on an average when one pound of honey is consumed there is produced about two-thirds of a pound of water, and since honey is one and one-half times as heavy as water, one gallon of honey when consumed produces approximately one gallon of water.

If we take for example a bee cellar containing 216 colonies and estimate the average consumption of honey during the winter at ten pounds per colony the total honey consumed is 2,160 pounds or 180 gallons. This produces 1,440 pounds of water or 180 gallons, enough to fill six 30 gallon barrels. If these colonies are in the cellar for four months there will be given off one and one-half gallons of water a day and unless there is considerable movement of air within the cellar the atmosphere cannot take it all up as water vapor and condensation will occur.

THE RELATIONS OF HUMIDITY TO TEMPERATURE.

Before discussing the changes which take place in the humidity of the hive it may be best to take up some facts concerning the moisture content of the atmosphere as influenced by temperature. It is of course well known that if warm moisture-laden atmosphere is cooled its capacity for water vapor is decreased and moisture is condensed. This is shown in the condensation of moisture on the outside of a glass of ice water. Similarly we have condensation on the surface of the leaves which we call "dew" if the moisture remains liquid and "frost" if it is frozen as it condenses. These phenomena are duplicated in the bee hive and bee cellar.

The problem of the beekeeper is to eliminate this moisture, which leaves the body of the bee in the form of water vapor, without condensation. This has been done in cellar wintering (1) by raising the temperature of the outer air, (2) by drying the air (as by the use of unslaked lime in the cellar) or (3) by causing the air to move so that as the atmosphere becomes laden with moisture it is replaced with other air capable of taking up more moisture.

To determine by weight the actual amount of water in the atmosphere is difficult in ordinary practice and the usual method is to determine the relative humidity, that is the amount of moisture in the atmosphere compared with the maximum which might be held at that temperature. The common method is by the use of the wet and dry bulb thermometers, to determine how much the wet bulb is cooled by evaporation. Then from this data the relative humidity is obtained from prepared tables.

To make clear the relation of the relative humidity to temperature it may be well to choose a few examples. For the first case, there may be assumed a cluster temperature of 60° F. (barometer, 30 in.) in an atmosphere which is fully saturated. In this event the slightest cooling will cause condensation and the wet bulb in such an atmosphere (if it could be circulated rapidly) would show no cooling. No evaporation can occur as the atmosphere cannot take up any more moisture. If, however, the wet bulb can be cooled at this temperature the relative humidity is less as the readings of the wet bulb thermometer are lowered. The temperature to which an atmosphere must be cooled to produce condensation is known as the "dew-point." This is also lowered as the humidity decreases.

If different temperatures are assumed for the cluster (all of which have been observed under different conditions by various investigators) the relative humidity of the warmer atmosphere which will show no condensation when cooled to cellar temperature is given in the following table. (barometer, 30 in.):

Assumed cluster temperatures.		Dew. Point.	Relative Humidity.
Dry bulb.	Wet bulb.		
60° F.	52° F.	45° F.	58 per cent.
65° F.	54° F.	45° F.	48 per cent.
75° F.	58.5°F.	46° F.	35 per cent.
96° F.	66° F.	45° F.	18 per cent.

In this table the numbers are chosen so that the dew-point is practically 45° F. in all cases, assumed as an average cellar temperature. It appears that a given amount of water given off by bees at 96° F. creates a much lower relative humidity (18 per cent.) than the same quantity of water at 60° F. (58 per cent.) because the warmer atmosphere is capable of holding more water vapor and relative humidity is simply an expression of the percentage present compared with all that the atmosphere can hold. However, to maintain a temperature of 96° F. necessitates the consumption of much more honey and this in turn gives off much more water vapor. Consequently with a cellar temperature of 45° F. we should expect much more condensation in a colony with a cluster temperature of 96° F. than in one with a cluster temperature of only 65° F., except that the increased heat would tend to produce stronger currents of air in the hive which might relieve the situation somewhat. Since 96° F. is about brood rearing temperature it is partly indicated why brood rearing during the winter confinement may be highly injurious, as it is usually held to be. It may be stated that a cellar temperature of 45° F. and a cluster temperature of 60° F. might not occur; the other temperatures used in the table might well occur under different conditions.

How Moisture Escapes From the Hive in Winter.

During the summer when nectar is being ripened into honey, great quantities of water leave the hive in the form of water vapor. During this period the hive is being well ventilated by fanning bees so that the atmosphere is changed rapidly and, being warm, is capable of taking up more moisture than is the atmosphere of the bee cellar. In winter when the bees are in a cluster this ventilation by fanning does not occur. The amount of water that must leave the hive is much less than in summer, but on the other hand it either must pass out in air set in motion by changes in temperature, or will condense on the frames, combs and hive and possibly run out of gravity.

If the atmosphere of the bee cellar is heavily charged with water vapor, as is frequently the case, that within the hive must be saturated. The additional water produced by the bees will therefore condense and run out the entrance. It frequently happens that the air inside is saturated while that outside is capable of taking up this moisture again by evaporation, so that there may be no water visible except within the hive, most often on the cover, and possibly also on the bottom board.

If the wooden cover of the hive is loose or if the hive is covered with some absorbent or porous material, the heat escaping from the cluster may cause the formation of slight upward air currents which will carry the moisture out the top in the form of vapor. Out of doors there may be condensation of moisture in the porous packing more rapidly than it can be carried off by evaporation, in which case the packing becomes wet and usually thereby less effective as a non-conductor of heat. With sealed covers the moisture must pass out the entrance and this may also occur in the form of vapor if the outer air is of sufficiently low relative humidity to take up all the water as it comes outside.

In situations where the temperature of the combs and hive does not often reach the point of condensation, or if a low temperature is prevented by packing, a tightly sealed cover can do no harm and many beekeepers report success in wintering bees in such conditions. The attributing of the differences in manipulation and methods to "locality" has been greatly overdone by beekeepers, particularly since they usually do not describe the characteristics of the locality or analyze their conditions to determine why certain things prove best. This peculiarity in the beekeeping literature is probably largely to blame for the discussions on the virtues of upward ventilation. It should be borne in mind, however, that while sealed covers may be harmful in colder regions, upward ventilation is not objectionable in warmer regions.

EFFECT ON THE HUMIDITY OF CHANGING THE OUTSIDE TEMPERATURE.

Any change in the temperature of the bee cellar may affect the humidity of the air in the hive in two ways. As the optimum cellar temperature is approached, the heat produced by a normal colony will diminish and this decreases the food consumed and consequently the water produced. The widely varying reports of the food consumed by bees in cellars find their explanation chiefly in the difference in the temperature of the cluster. As the cellar is cooled below the optimum not only is there more water produced, but the cooler atmosphere is incapable of holding so much and there is therefore an augmented cause for condensation.

In this connection it may be of interest to record a few observations made by one of the authors on bee cellars not long since. The first cellar was away from the house, was ventilated by the sub-earth system and was without any artificial heat. The temperature of the air at the floor was 40° F. and in the centre of the cellar 41° F. There was little circulation of air and moisture had condensed freely in the chamber above the cellar proper, under the roof. In this cellar were 98 colonies in 24 stacks. Of these, condensed moisture was seen on the bottom boards of 21 in the bottom tier, 11 in the next tier, 3 in the third and 6 in the top tier. There was no condensed moisture on the floor. The only adequate explanation for the greater number of wet colonies in the lower tiers is the slightly lower temperature at the floor. If now there had been more ventilation provided without greatly lowering the cellar temperature, this moisture might at least have reached the chamber above the cellar before condensing, and doubtless if the temperature could have been raised a couple of degrees all of the condensed moisture would have disappeared from the bottom boards. There might still have been condensation on the covers, where it first appears, but this, too, would doubtless have evaporated at 45° F. with good ventilation.

In a second cellar where the temperature was 45.5° F. at the floor and 50° F. six and one-half feet from the floor, there was no condensed moisture in any of the 93 colonies. Here the ventilation was much more abundant and the cellar was artificially heated. In a third cellar, temperature 40° F. five feet from the floor, there was moisture on several covers but none on the bottom boards. The ventilation was excellent. In a fourth cellar, temperature 52.5° F., no condensation was observed even on the covers. It therefore appears from these few observations that in the two cellars at 40° F. the moisture was more in evidence in the poorly ventilated cellar and that when the temperature was raised to 45.5° or 52.5° F. no condensation occurred. In this connection it should be remembered that the cellar temperature is often higher than that of the outer air, thus giving the atmosphere a greater capacity for water vapor. For example, if air comes from the outside at 0.0° F. into a cellar where it is warmed to 45° F. its capacity for moisture is increased thereby almost eight times (barometer, 30 in.) so that even if the atmosphere at 0° F. is saturated, it is capable of taking up much more moisture when it reaches the cellar temperature. Moist air passing from the cellar will often cause frost to form about the ventilating holes.

The only conclusions that can safely be made from the data on these four cellars is that concerning the capacity of the atmosphere for water at different temperatures. Other factors entered into the wintering of bees in these four cellars so that probably no reliable conclusions could be formed from data as to the food consumed by the various colonies, even if these were available.

In discussing the condensation of moisture in the hive and the various methods by which it may be avoided, one must not lose sight of the fact that little is definitely known as to the effects of such condensation or of a high relative humidity on the wintering of bees. From the experience of numerous beekeepers there is justification for concluding that bees winter better in the drier cellars, but it is not so clear whether this statement would hold true for all cellar temperatures. In most systems of cellar ventilation the object accomplished is not so much to provide oxygen for the bees as to eliminate the exhaled moisture without too great condensation. The amount of oxygen needed to oxidize a couple of pounds of honey per month is not great. Even in a cellar in which a ton of honey is consumed during the winter, as in the theoretical case cited, sufficient oxygen would probably get in without any special provision for ventilation. This is not true for the elimination of the water, however.

In discussing the exclusion of moisture from the hive it is necessary to bear in mind one other hiding place for moisture, usually overlooked. In hives where condensation is common the hive and cover often become saturated and sufficient moisture may be held in this way that it comes through and blisters the paint on the outside surface of the hive. It is clear that on account of this absorption of water by the hive many records of weights on the removal of bees from the cellar fail to give accurately the loss in weight by the consumption of honey and the death of bees. Much honey finds its equivalent in the water in the soaked hive. Before drawing any conclusion as to the honey consumed we must be sure that condensation or evaporation do not affect the weights of parts assumed to be constant. A reverse example of this phenomenon is to be found in some records made of the weight of a hive and combs (without bees) made recently. The hive lost weight constantly by evaporation when placed in a dry room.

EFFECTS OF HUMIDITY.

It may as well be stated that we have no data showing the effects of an increase or decrease in the relative humidity on the activities of the bees in winter. We therefore do not know what relative humidity is best, for we do not know whether the moisture is the cause or the effect of poor wintering. From practical experience it may be concluded that excessive condensation is indicative of poor wintering and most beekeepers aim to have their cellars as dry as practical. Whether this is desirable for the warmer cellars remains to be determined.

It is evident that condensation of moisture on the combs of honey is not beneficial since this favors the growth of molds. The damp dark interior of the hive is certainly favorable for the growth of these organisms. It is not yet shown how these are injurious but they can scarcely be assumed to be desirable as food. A still more serious consideration is the fact that honey tends to take up moisture either from a highly saturated atmosphere or from water condensed on the surface of the comb. This dilution of the honey often leads to some fermentation, injuring the honey as a food.

MR. ALFRED PUSEY: What do you think is the best temperature for the cellar?

Dr. Phillips: I do not object to telling you some of the things we have tried. This room I spoke of was a constant temperature room. It was cooled or heated as the case might require. The first year we set it at 43° because we thought that was what the beekeepers would require. We found from our other work that the hive temperature should be around 57°, and then they do not have so much work to do. The second year we raised the cellar temperature to over 50°, and then we got into some difficulty over the humidity phase of the question. The third winter we had the bees in a cellar at Washington, and we kept the cellar as hot as we could with the heating system we had. The temperature ranged from 48° to 55°, and the bees wintered very well. I am not going to give anybody advice on the subject of cellar winter temperatures until I know more about the humidity side of the question. If the humidity was all right I would say 57°, but when you raise the temperature so high you make the air very dry, and you have no end of trouble right there. The last bulletin we published we said to outdoor winter bees, because we have not solved that trouble.

Mr. J. D. Evans: I winter in the cellar, and I can winter every hive of bees without any loss. They must have plenty of honey and plenty of bees, and they must have the right kind of honey. I find my bees keep the best and the quietest when the temperature of the cellar is about 42°. If the temperature rises to 47° my bees are in an uproar. My cellar is as dry as this room. If there is any ice or snow on the hives when I put them in in three days they will be dried out. There is a possibility that my bees may suffer from being too dry. I noticed one year when I first put them out they lit on damp banks.

Mr. Alfred Pusey: Perhaps some friend could advise me as to what best to do with fixed bottom boards in the cellar.

Mr. J. D. Evans: I have my bottom boards fastened on with staples. I have an inch strip nailed around three sides, and the hives are fastened to that securely. I want it air-tight, and I want my quilt on top of the bees air-tight.

Mr. W. W. Webster: Do you find that the bees want to change position during the winter?

Dr. Phillips: There is a constant interchange of the bees during the winter. At a high temperature the interchange is very slow. As it gets colder the interchange is more rapid. The bee on the inside will force its way head first through the cluster. Then that bee comes out and turns around and takes its place and another bee is released from the work. The colder it gets outside the more bees become engaged in heat generation and the outside shell becomes more compact in cold weather and the cluster becomes smaller, yet there are still more bees engaged in heat production on the inside. I did not say that the proper cellar temperature was 57. The air surrounding the bees ought to be 57. I would not be surprised but that that is the temperature in Mr. Evans' hives. The air surrounding the bees is what determines their action.

Mr. Morley Pettit: In cellar wintering we always find it an advantage to have the hive temperature higher than the cellar temperature. We manage this by having a chaff cushion on top of the hive. We add this chaff cushion, and the inner cover, which in our case is of cloth, is loosened just enough so that there is room for a little ventilation up through this chaff cushion. By having the hive temperature higher than the room temperature we get a slight circulation of air through that chaff cushion. The bees are in an ordinary cellar, walled up with stone. It is built in a clay bank. We find a cellar temperature of about 42 about right. The thermometer is hung in the middle of the room half way between the floor and the ceiling.

Mr. T. J. Cauldwell: Do the bees require very much air in the winter time?

Dr. Phillips: That depends entirely on the temperature. In temperature where they are clustered tight they give off carbon dioxide very rapidly and of course require oxygen rapidly to replace it.

Mr. T. J. Cauldwell: I have noticed that bees do better buried in snow, entirely buried.

Dr. Phillips: They are very well ventilated under those circumstances. The main ventilation problem is to carry off water evaporation. What I want to do is to get rid of this moisture without condensation. That is why we go to so much trouble in the matter of ventilation.

Mr. F. W. Krouse: Supposing there is water in the cellar, does that affect the bees? I know a man who winters his bees in the cellar and there is water in that cellar half the time. I have helped to carry out the hives and I had to wear a pair of rubber boots and I could not keep the water from going in over the tops.

Dr. Phillips: I should think under such circumstances the humidity would be very high. You could not get any worse condition than that.

Mr. J. F. Dunn: I know one cellar that has a spring of water in it and the bees do well in that cellar.

Mr. R. E. L. Harkness, Iroquois: I think a little moisture in the hive is very beneficial. I think ideal conditions are where the temperature in the cellar is from 42 to 44 and it is fairly dry.

The Chairman: The lower the temperature the less humidity the colony will stand.

Dr. Phillips: The lower the temperature the more quickly you get condensation.

Mr. D'Arcy Scott: Assuming you have a cellar temperature of 42°, how many cubic feet do you require for a colony?

Mr. L. Harkness: I know a man who uses a 10-framed hive, and he will pack his cellar from the floor to the ceiling with these hives, and he tells me that he will have practically no loss. In that case you would simply have the cubical contents of the hive.

Mr. J. F. Dunn: I do not think it makes much difference how many you put in the cellar provided you have good ventilation. We ventilate our cellar by a window which runs pretty well into the ground and then we run an air-shaft up alongside of the house. The proper place to ventilate a cellar is near the floor because the foul air will go to the bottom. I do not know of a better way of ventilating than to have a sub-earth duct about 150 feet long. The air will warm in that duct to about 42° and if you have a stream of fresh air like that coming into the cellar all the time and the foul air going out you will have a well ventilated cellar and you will have no trouble.

Mr. L. Harkness: For several weeks the weather in our locality will go from zero to as low as 20 below. I believe in ventilation but you must be careful in extremely cold weather. I close up my cellar in the winter.

The Chairman: We do not want beginners to think that bees will winter better when there is water in the cellar. It is well to bear in mind that experienced men who have wintered in the cellar have come to the conclusion that a temperature of from 42 to 45, with as little humidity as possible, is the best. I am inclined to think that with some outdoor wintering the bees winter in spite of conditions and I think that was the case with the bees in this cellar which had water in it. I remember a cellar in which there was a running stream and yet that cellar was dry.

Mr. E. Lewis, Cayuga: What should an 8-framed hive weigh when put in a cellar?

Mr. W. H. Kirby, Oshawa: Last fall I had to do some feeding, and I fed with slabs of sugar candy, hard candy. In order to operate on this food the bees have to have moisture. It is better to have a little moisture in the hive but you must have it in the right place and that is above the bees.

Mr. Chas. Blake: If you give your bees first-class stores for the winter they will eat much less of it and they will generate less heat in the cluster and be less disturbed, and consume a less amount of honey. The bees will come through in far better condition.

Mr. Kirby: What ventilation do you give?

Mr. Blake: None, whatever. These cellars are in a sand-bank. If it was clay land it might be different. The bees are not crowded. They have plenty of room.

Mr. Evans: I do not think it is necessary to have sub-earth ventilation. I have a chimney which is about 40 feet high, and I have a window which swings on hinges and which is kept open in all ordinary weather. I have been very much interested in reading some of Dr. Phillips' papers about how the bees warm themselves up. If the bottom boards were off the hives would not the bees have to warm up the air in the cellar?

Dr. Phillips: If the bottom boards are off the air current will carry the heat away more rapidly, but if the cellar temperature is relatively high it does not make much difference.

Mr. Chas. Blake: Somebody asked what should the weight be of an 8 or 10-framed hive. They should weigh at least 55 lbs. without the cover.

Mr. L. Harkness: Bees will winter on 10 lbs. in the cellar but I would advise giving them 25 lbs. I do not think you should disturb your bees any more than possible.

Mr. F. J. Lee, Lee Valley: Last winter, one morning the thermometer at my place was 50 below zero. I had 10 hives of bees which were wintering outdoors, and they wintered better than the ones I had in the cellar. We had 85 in the cellar and we lost 6 of them.

The Chairman: I am glad that Mr. Lee brought out one point and that is that we can winter outdoors successfully where the thermometer goes down to 50 below zero.

HONEY PRODUCTION FROM THE GOLDEN RODS AND ASTERS.

F. W. L. Sladen, Dominion Apiculturist, Ottawa.

An investigation that is being made by the Bee Division at the Central Experimental Farm, Ottawa, into the source of supposedly injurious winter stores in moist hay lands at Amherst, N.S., which the local beekeepers say necessitate the removal of the stores and the substitution of sugar syrup, and also into the whole subject of natural winter stores, which, in many parts of Canada and in some years more than others, are found to produce more or less dysentery or to granulate in the hive, involved, it soon became apparent, a study of the different species of the golden rod and aster, because these produce a large part of the honey stored for winter in most places.

The beekeeper views botany from a different angle to the regular botanist. The latter searches for rare species, and is never so happy as when he has discovered a new one. The beekeeper pays attention only to the common species, and he wants to know whether the bees are collecting much nectar from them, how long they will continue to collect it and what is the quality of the honey.

Some species of golden rod and aster are difficult to separate, and it would only be leading you into a fruitless field of technicalities and possibly of controversy if an attempt were made to point out the distinction between all the different species found in Eastern Canada. It will be much more satisfactory to briefly review the two genera in the light of some bee botanizing that has been done in the neighbourhood of Ottawa, lumping into groups the species that are difficult to separate.

Take, first, the golden rods, known scientifically as the genus *Solidago*. The latest edition of Asa Gray's manual gives twenty-five species of *Solidago* from Eastern Canada. Eleven of these have been found around Ottawa. All are familiar with the erect golden rods having a spreading fern-like inflorescence so common on our roadsides and in meadows and pastures. Examining the underside of the leaves of most specimens of these, one finds that they have only three conspicuous veins or ribs. This proclaims that they belong to the *canadensis* group of which *canadensis,* with its small flowers and nearly smooth stem, is usually the most abundant in dry places and *altissima,* a taller plant with the stem and underside of the leaves down, in moist, rich places.

Fully 75 per cent. of the golden rods around Ottawa belong to the *canadensis* group. Individually the members of this group produce comparatively little nectar, but their great abundance makes them important collectively. During the first two weeks of their blooming period, that is from the end of July until the middle of August, they are quite neglected by the bees if the weather is dry.

Solidago rugosa, another species with spreading inflorescence, but with the conspicuous veins of the leaves numerous and net-like and the whole plant very hairy, is frequently common in moist, shady places.

A very distinct species of golden rod is the narrow-leaved golden rod *S. graminifolia.* The leaves are narrow and ribbon-like and the small flower heads are bunched in little terminal clusters. This species is much complained of as a weed in damp hay meadows in the Eastern Provinces, and the bees have been seen working on its heads, both at Ottawa and at the Experimental Farm, Nepean, N.S. It may be here remarked that it is often hard to discover whether a plant is a large honey producer or not. Bees will often crowd on golden rods and other plants that are producing very little and appear busy on them when other more abundant sources of nectar are first cut off. In plants with tubular flowers, such as golden rod and aster, a very good help in estimating the quantity of honey a species will yield is to squeeze firmly the head so as to express the nectar. Where minute drops of nectar can be thus squeezed out of the tubes the plant is a good honey producer provided the tubes are not so long that the honey is largely or wholly inaccessible to the honey bee.

This test confirms the importance of two late flowering species of golden rod that grow in dry or sandy soil, *S. puberula* and *S. squarrosa.* In these the inflorescence is compact and occupies a considerable length of the upper part of the erect and strong stem. *S. squarrosa* may be known from all other species of golden rod by the abruptly spreading tips of the bracts of the involucre. Two colonies of bees taken on August 25 this year to a sandy plain forty miles north of Ottawa each gathered in three weeks about forty pounds of surplus honey from these two plants. It is estimated that at least three-fourths of the honey came from *S. puberula* which was much more abundant than *squarrosa.* You will note that this honey, of which there are samples in the room, is of a light color and the flavor and aroma are pleasant and distinctly suggestive of golden rod. All this honey was gathered after a frost on August 27th had killed potatoes, buckwheat, corn and bracken. The golden rods were uninjured by the frost. The browning of the tops of some of the plants, which a casual observer might have ascribed to frost, was due to the fact that in a flower head of golden rod the first flowers to open and to wither are those at the top or tip of the stem. *S. hispida,* another late-flowering species very like *S. puberula* in general appearance but with a hairy stem, was also present on the plain and contributed a little of the honey.

Turning now to the asters, to separate the numerous forms of which botanists have been driven almost to despair, Asa Gray's latest edition gives thirty-five species from Eastern Canada. Twelve of these have been found at Ottawa.

In tackling this difficult genus the first thing one should look at is the lower leaves. Are they heart-shaped and stalked? If so, and the flowers are pale blue and rather small, the plant belongs to the *cordifolius* group. These are the commonest asters in the Gatineau Valley north of Ottawa where they grow in dry open ground and carpet the railway bank and ungrazed thickets with their star-like flowers. During a period of continuous warm and sunny weather from Sept. 11th to Sept. 22nd, 1914, following a moderately wet August, the gathering of approximately 12,000 pounds of surplus honey, besides sufficient stores for winter to make syrup feeding unnecessary, was reported by Mr. J. Martineau in his apiary of 300 colonies at Montcerf, about 100 miles north of Ottawa. This nectar came principally from *Aster cordifolius* (*Sens lata*) with a little from *S. squarrosa* and *S. puberula.* The honey was light in color and of good flavor. It did not granulate in the comb and the bees wintered satisfactorily on it. Related to *Aster cordifolius is A. macrophyllus* which also has heart-shaped leaves, but it is a coarser plant with large pale blue or white flowers and is easily known by the fact that the hairs of the branches of the inflorescence are glandular and, when rubbed, are sweet-scented. This species grows on the borders of woods, and heads yielded a considerable amount of nectar on pressure in favorable weather. However, it is not very common in the Ottawa district.

The well-known tall showy species with large blue flowers, purple hairy stem and clasping leaves, growing usually in moist places, is *Aster puniceus.* It has not proved to be a large producer of honey around Ottawa, but it is not so abundant as its conspicuousness would seem to indicate.

Next in abundance to *cordifolius,* and in the immediate vicinity of Ottawa exceeding it, are two or three closely related species with numerous small to medium sized white flowers borne on ascending many-branched stems and having narrow ribbon-shaped leaves. These are *Aster tradescanti* and its allies. They grow most abundantly on low and badly drained land. The bees visit the flowers of the *tradescanti* group quite extensively, and, now that *cordifolius* has proved itself to be not guilty, suspicion rests on these as the source of unwholesome winter stores that are occasionally gathered at Ottawa. In the winter of 1914-15 the bees at the Central Experimental Farm, Ottawa, like those in many other parts of Ontario, wintered not so well as usual on account of food troubles, and in spring the stores in many of the hives were found to be extensively granulated. The source of the granulated and unwholesome stores has been attributed to various plants from maples to aster, but it must be remembered that these food troubles became marked in a winter following an unusually long period of fine weather in the middle of September and it seems likely that some fall flower or flowers yielding nectar during this period was responsible for it. If we can discover that plant it will only be necessary for the beekeeper to note its abundance within two miles of his apiary, and whether weather conditions have been favorable for a flow from it for him to decide to what extent he should replace or supplement the winter stores with sugar syrup to insure safe wintering.

Aster acuminatus, a species with large broadish leaves that grows in woods, secretes abundant nectar under favorable conditions and is a favorite of the bumble bees, but much of the nectar is probably inaccessible to the honey-bee on account of the length of the flower tubes.

Aster umbellatus, with a flat topped head of white flowers, contains nectar and is visited by bees, but it has not proved a common species.

The golden rods, and probably also the asters, come into flower earlier in the north than in the south. At Ottawa the flowers appear about two weeks earlier than in Southern Ontario. When the flow from aster and golden rod is cut short and followed by cold weather. the honey may fail to ripen completely and may remain uncapped, the bees at this time of the year being less inclined to produce heat than in summer. The partly ripened honey may ferment and thus become unwholesome and cause winter loss. Fermentation is more likely to occur in moist coastal regions than in the interior. Another disadvantage consequent on the lateness of the flow from golden rod and aster is that the honey is collected by bees that are to pass the winter and the work ages them and increases the rate of mortality of the bees in the colony in winter and spring.

OUTDOOR WINTERING.

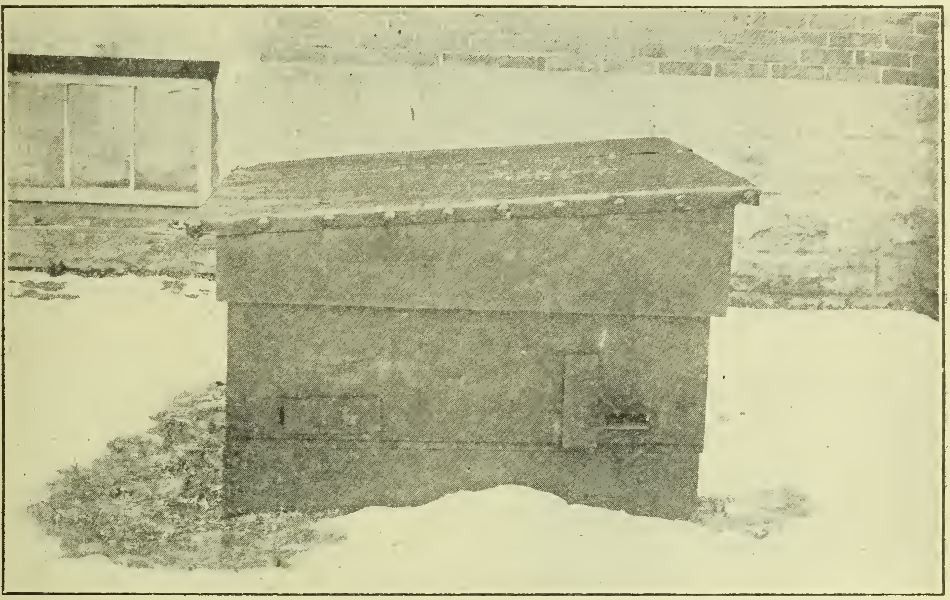
H. G. Sibbald, Toronto.

I cannot think of anything to tell you about wintering bees except to describe the way I do it. It is possible I will forget a great many details, because they do not worry me very much. Wintering is a puzzle to some people, and Dr. Phillips yesterday gave you to understand that in his observations he has found that to be the case. A great many people fail to winter their bees. I have known of many people who have bought nice equipment and started out in good shape and get along all right for a few years, and then a hard winter comes and that is the rock upon which the ship is wrecked, and after a hard winter the bee yard looks more like a grave yard with the hives for monuments than anything else.

I put my bees away three weeks ago; I will probably not see them until next spring. What is there to tell you about that. I am not there to do anything and they are looking after themselves. The only way in which I can make anything out of this subject is to tell you how to prepare the bees for the winter. That is the main thing in wintering bees. There is no use trying to winter half a colony of bees or a small colony and expect them to come out strong the next spring. There is very little use bothering with half a colony of bees at any time. You must have a full colony in the fall if you wish to winter them successfully; if you have two half colonies, the best way is to unite them and make one good, strong colony. It is better to have them all uniform strong colonies than a lot of weak ones.

The only way to keep your bees strong and to winter them properly is to keep them with good queens, and see to it that they are not queenless at any time during the season. If you do that you will have a constant flow of young bees hatching in the hive, and when the right time comes to fix them up for the winter, you will have a strong colony. It is a wise thing to have a good queen in the hive during the winter, ready for the hive. Just before you get them ready for wintering, if they have not a good queen, give them one. The queen is the engine that has to supply the power for the next season.

The next point, and perhaps it is just as important, is the stores. There is no use wasting stores if you have not a good colony and a good queen. Some of the honey that our bees gather is not good honey for winter. That is not true, of course, of all honey, because good clover honey and good basswood honey, and even good buckwheat honey makes good stores if the honey is well ripened, but a lot of other honey that comes in between seasons, for instance the honey dew—a little honey dew—will kill a colony in the winter.



Winter case used by Mr. Sibbald. One entrance reduced as in winter. The other opened as for ventilation in late spring.

The stores that I use are mostly sugar stores. My method of management during the season leaves the colonies in such condition that there is very little honey below. They use the brood nest for brood nearly all the season, and when the fall comes there is practically no honey in the bottom. I use sugar syrup to feed them, and I give them plenty. There is no use being stingy about it. When you have 20, 25 or 30 pounds in, by putting five more in, you will sometimes save the colony and keep them good and strong. Somebody yesterday said that a colony would winter well on ten pounds, but they will not winter on ten pounds if that is all they have. There is sense about that, and from practical experience I can say it is quite true. If they have plenty of stores they do not use quite as much as they would if they were short of stores, especially if the stores are well ripened and sealed over. When the bees gather tight for the winter and leave the stores at the outside uncovered, moisture gets in. If the unsealed stores are at the outside they will absorb moisture and stores will sour and be poor stuff and the bees will soon have dysentery, and they will start to breed. They seem to realize that they are getting diseased, and they have got to have a new generation, and they will breed early in the winter. That is wrong. They should not have to do that. For every bee they raise at that time of the year they have to keep a certain amount of heat up, and for every bee they raise you will lose four or five. It is not very hard to figure out where your colony will go at that rate.

I like to feed my colonies up to seventy pounds without the board on top, just with the quilt on top. That is a ten frame Langstroth or ten frame Richardson hive. After you have them up to seventy pounds it will not be very long until it will decrease from evaporation. Therefore, I would not quit feeding until they have seventy pounds; I would not mind seventy-five pounds.

In our district we have not as much fruit as you have in the low lake regions of Ontario, where you have the fruit belt. Therefore, I have to provide them with a little more feed in the spring than you have.

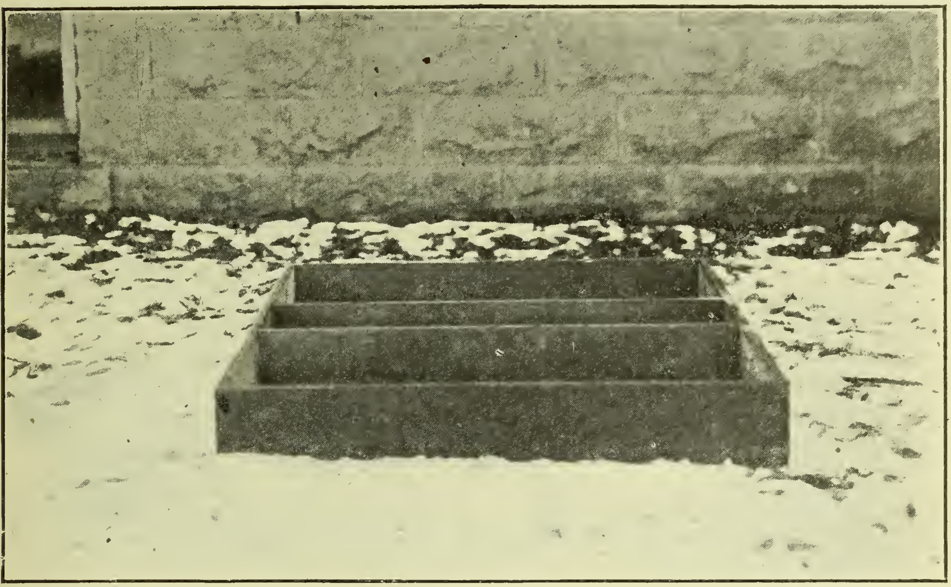
The next thing about wintering outside is to have your bees in a sheltered location. I have wintered bees in a windy open location, but I very much prefer a good sheltered place. I would rather have a natural wood shelter—the south side of a bush, surrounded a little bit by a bush or hedge or something of that kind, that makes a good natural shelter against the north and west winds. If you cannot get that, a good board fence would do. I got a good idea at Mr. Chrysler's bee yard. He nails every other board on the fence, and every other one just slips through the wire to hold it in the winter. In the spring he takes every other board out and that gives ventilation for the summer. A lot of ventilation through your yard in the summer time will help to control swarming. If you have a well-sheltered yard and the bees are well fed up for winter the next thing of importance is the packing.

I have had experience in wintering with a single case, but I prefer four in a case, and I will give you reasons why I prefer them in that way. There is more warmth in the four colonies placed in a case together, and that helps a great deal to keep a nice, even, dry temperature. As a rule you will find four colonies will cluster in severe weather towards the centre, making one cluster out of four, and in that way keep the inside walls nice and warm all the time, and I consider that a great advantage.

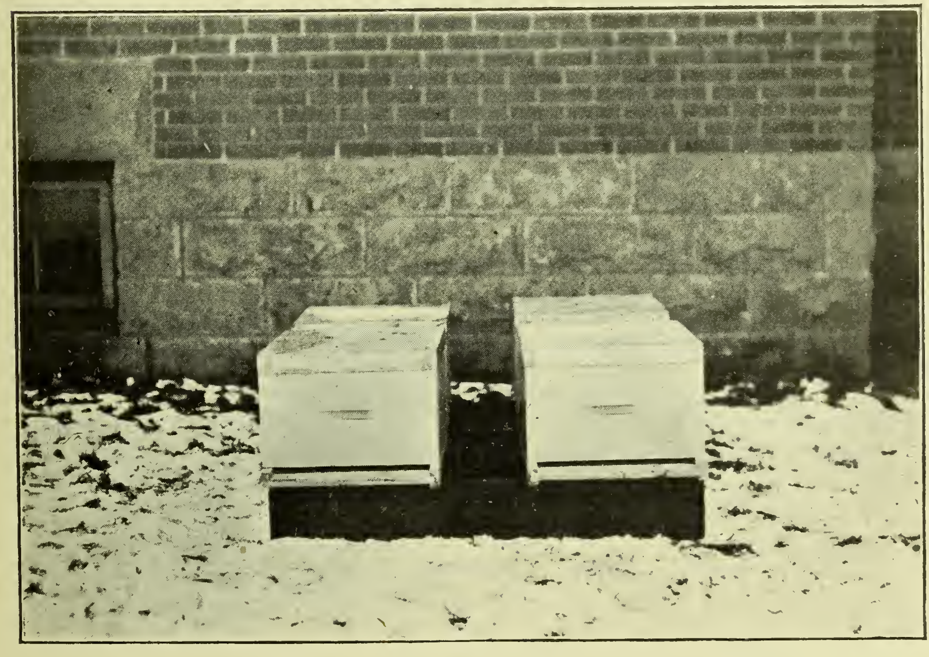
There is economy in this method, because you can make the case for four with about the same cost that you can make one single case, and that to my mind is quite an item.

Another advantage of having four in a group is that it gives you very much more room in your yard, and you can go through the yard with a wheel-barrow or anything to take the honey to the honey house, or work in your yard in any way that you might desire. The point is you have more room to work.

This is the stand; I have two boards across the centre making a summer stand for the four colonies. Once you level them, you hardly ever have to touch them again because they will stay there year after year without levelling again. We have four entrances, two on one end and two on the other. The entrance is four inches long and two inches high; that gives a pretty big entrance in the spring for the outside entrance. When this button is closed down, the entrance is about three-eighths of an inch by two inches high. The idea is that the bees will hardly



Stand of quadruple winter case.



Stand with quadruple winter case with hives as in summer.

ever pile up two inches high so as to block that whole entrance. If the entrance was the other way, they might pile up and block the entrance.

Q.—Is there a piece of wood put over the shield to keep the snow from packing down?

A.—No. There should not be any alighting board in the winter, because the snow collects on it and it will freeze and block up the entrance.

Rev. Eric Lewis: Why don't you have the entrance opposite the centre of the hive?

A.—Because there are two hives on this side, and we want to keep the entrances as far apart as possible. The entrance is on the opposite corner of each hive and that leaves much more space between these entrances. This button should be made of hard wood, so that the mice will not be able to cut through it.

Rev. E. Lewis: I do not understand why you have a button at all if you have an entrance three-eighths by two inches?

A.—In the spring and the fall of the year you want a larger entrance: it would not do to have them closed up like that in the spring. I close mine up as soon as I pack them, the first of November, and I leave them that way until spring, but this larger entrance is needed in the spring.

Q.—Do you prefer the hooks to hold the cases together on the outside?

A.—My case is only about a foot high and nailed. I have another section which fits over this one and holds the packing being held with burlap bottom.

Q.—How do you handle the top part when you are working with the bees?

A.—You can lift one side up and put a prop under it and examine the two colonies on that side, and then you can examine the two on the other side by propping it up the same way. If you have a helper you can take it right off.

Mr. Clare: What thickness of packing do you recommend and what material?

A.—I have used sawdust, but I consider that too close, and when it gets damp it won't dry out the same as planer shavings. You can pack with planer's shavings, and if they are damp to start with they will dry out during the winter. Chaff has a fascination for the mice, but of course you can prevent mice getting to it, and it makes good packing. Leaves are recommended by a great many people, but I never found leaves satisfactory. Last fall I ran out of shavings for a couple of cases, and I packed them with leaves, but this spring they were damper and in not nearly as good condition as the colonies where I had used the shavings. With leaves I think you need a little more room for packing. We use planer's shavings with all our hives, and about an inch and a half packing on the front and about three inches on each side. That is not very much packing, and I do not think it takes more than a bag and a half of shavings to pack four colonies around the sides, and five or six inches on the top.

Q.—Do you change the position of the bees in the spring?

A.—No, just leave them in the same position all the year round. The best time to pack bees up is in October—any time in October seems to be about right, the earlier perhaps the better. The earlier they are packed the less chance there will be of any condensation of moisture in the hive, because when the cold weather commences to come, that condensation occurs at the top of the hive. The bees will stand any amount of cold if they are dry. One of the main things to figure on in outdoor or indoor wintering of bees is to keep your colonies nice and dry.

Mr. Krouse mentioned yesterday about wintering in a cellar where there was water. I presume that was a very warm cellar and comfortable otherwise. I tried to winter in a cellar like that one time, but the temperature got low and I had very poor results. I tried three times to winter in that cellar, and I changed it each winter, trying to improve conditions and make it warm and to keep the place drier, but I could not succeed in wintering there.

A very small entrance is required for wintering and the reason that is the case is because it keeps the outside air away from the bees to such an extent that it will not introduce rapid changes in temperature. The evener you can keep your temperature in the hive the better it is for the bees. That might be arranged by having the entrance not too large, because then the inside temperature will not change so often.

To bridge the entrance I have an inch or an inch and a half cleat nailed on the bottom of the bridge; it keeps the packing up. The top of the bridge should be just at the top of that two inch opening; that keeps a two inch space clear across the hive, outside of the hive proper and inside of the case allows for air and room for the bees to get around. Supposing one side of the inner entrance clogs, they can get out the other side and come to the outer entrance. I consider it very important to have a bridge one and one-half inches up from the bottom board of the hive.

Q.—What sized entrance to the hive?

A.—The same as the usual entrance.

Q.—Would not that clog?

A.—No that will not clog all the way across. You have three-eighths inch entrance clear across your hive inside, you have a vestibule— a chamber that is neither hot nor cold—where the bees can come out if they are dying rapidly, and they won't clog the entrance.

Mr. R. B. Ross: Does that bridge go right across the both hives?

A.—No, just one hive; they cannot get from one colony to another. There is a bridge for each colony.

Q.—Do you have any packing under the hive?

A.—No, I do not use any packing under the hive.

Q.—Would it not be better to have packing under the hive?

A.—I have tried that out, but I cannot see any difference.

Mr. E. T. Bainard: Did you ever try a sheet of tar paper

A.—Yes, I have tried that. When the case is on, there is an air space of six inches under the stand; this stand just comes down to about the level of the ground.

Mr. F. W. Krouse: How often do you have to renew these stands that are so close to the ground?

A.—I have not had to renew any yet, and I have had some of them eight years.

Q.—How would concrete do for that stand, I find that lumber rots very rapidly?

A.—Concrete would be all right if you thought you were going to be there forever. I have had to change yards and move around so much that I do not want anything as permanent as that. This will last a long while and you will get your money's worth out of it.

Q.—What thickness of lumber do you use?

A.—Seven-eighths.

Q.—Is your soil sandy or clay?

A.—Clay.

Q.—I find that lumber rots in about two years on some soil?

A.—I do not put stand right on the ground; I always put bricks underneath.

Q.—What kind of lumber do you use?

A.—Cedar, pine and hemlock; it does not matter if it warps a little. They are only three and one-half feet long.

Q.—You raise them a little off the ground?

A.—Yes.

Q.—You are one inch off the ground?

A.—Of course an inch of snow will close that up, and in an ordinary winter no air will get under.

Miss Pettit: How do you pack the hives on top?

A.—We have a section about six inches high at one corner running to ten inches at the other. It is made large enough to slip over the case; just an inch from the bottom I have a strip nailed around the burlap, and the packing is all put in here. The top is made of roofing paper, and I nail two inch strips on about a quarter of an inch apart. I made some of them farther apart, but I found the mice get in. Put them across and then put a roofing paper on and you have a quarter of an inch space between slats which gives ample ventilation for the top of the packing. The air passing in at the bottom and up through the top keeps the packing perfectly dry and will take out any surplus moisture.

Miss Pettit: Do you use packing duck for hive quilts?

A.—No, ordinary burlap sugar bags.

Q.—Do you let the burlap go down over the edge of the hive?

A.—I usually have it an inch larger than the hive.

Q.—Do you find that at the time of rain storms that burlap will act like a lamp wick and bring up the moisture?

A.—I use a little sun cap which keeps the rain from getting in.

Mr. William Elliott: Do you think it any advantage to have the bees cluster to the inside of these four colonies?

A.—Yes, that brings out another point. If you want to winter a small colony, it is far better to put them on few combs and put a division board in. Take, for instance, a small colony that only occupies part of the hive. The other part of the hive being empty, moisture is apt to accumulate on the empty part of the hive, and when the weather becomes quite warm, it will run down and make everything damp and mouldy. If the colony is strong, they will throw off that moisture.

Q.—Give us your idea of a strong and weak colony?

A.—In the fall of the year I have nine combs in a ten frame hive; sometimes I do not have more than nine all the time. Nine combs in a ten frame hive in the fall of the year is all right for the winter. I like to see them in the fall right clean across and all the way down—bees all over the inside of the hive. Then in the winter, I notice that they cluster right on the bottom board: I like a good strong colony.

Q.—You spoke about dampness softening the honey on the outside and causing it to be unfit for use; if your bees are in four hives together, all the outside honey is going to be soft and damp?

A.—A strong colony in this hive and the honey sealed on this outside will be in good condition and the bees will expel all the dampness.

Q.—Why do you leave one frame out?

A.—Just to give them a little more room for ventilation during the summer, and it is easier to manipulate and take the combs out and examine them for queen cells; there are two ways of getting honey out of the combs in spring, one way is to jam the combs tight together, but the bees won't stand for that; they want a big space between each comb. Another way is to separate the combs and give a wider space, and they won't stand for that either; they will take the honey out. You will find that out in the fall of the year if you want them to clean up the supers.

If you put the whole number in they will leave the honey there, but if you put them far apart or too tight together the tendency will be to clean the honey out.

MR. ROBERT FOWLER: Why do you leave nine combs in instead of ten?

A.—Because they will seal them up inside and have a nice cluster place. The combs down here are not so tight together and it leaves more space for the bees to cluster.

Q.—Are they not warmer in the winter time?

A.—Yes, the more bees you can get together the better. We know that empty comb will soon be filled with bees. They go into the cells and then they cluster on the outside with their backs together and they fill up all the space, and the more space you have there the better for the bees to cluster.

Q.—When do you put your other frame in?

A.—In the spring of the year. If you have the time and the inclination: but you will have a good colony without tinkering with them at all. It is only the fellow who does not winter his bees properly that has to bother about tinkering with them in the spring. If you have lost so many bees that you have only fifty per cent. left in each hive you have only wintered half your bees, and I do not call that wintering at all. You should winter at least ninety-five per cent. of the cluster you put away in the fall, and if you do that you have a big colony to start with and it will not require very much handling to get them ready for the harvest.

Q.—You told us the ideal cluster for the winter is to leave one frame out of a ten frame hive?

A.—That is before they cluster.

Q.—In what percentage of colonies do we expect to realize that ideal?

A.—In every colony in your yard. That is the secret of the business; never neglect any colony in your yard. If you go away for a holiday for six or eight weeks and leave your bees alone you will come back and find a lot of them out of condition, and then it is too late to get them in condition. I stay right with them, and I take my holidays in the winter. In the summer time I am there all the time keeping my bees in good condition.

Q.—What do you consider the best way to unite two weak colonies?

A.—It is a very easy matter to unite two colonies in the fall. I go through a weak colony and take out half the combs. Take the combs that the bees are not on very much. Brush off any bees that are on them and then you will have them all on four combs. Then go to the other colony and do the same with it, and take the queen away from one of them, whichever is the poorest queen. If the queens are equally good take one of them away and then place the combs of the bees in with the other colony. Do not mix them, let them mix themselves.

Q.—Do you find that some of them will go back to their old location?

A.—Very few in the fall of the year. I have done that for quite a while and I find I can take a colony in the fall of the year and move it wherever I like.

Q.—Don't you think it would be a better plan to put one on top of the other for four days and place them together after that?

A.—No.

Q.—I asked an experienced beekeeper and that is what he told me, to place a sheet of paper between them, and I asked him what kind of paper to use and he said an ordinary newspaper, and I said one thickness or two thicknesses, and he said one would be sufficient. I put one on top of the other and I put a sheet of paper over, and to my horror the next morning, there must have been in front of the hive one colony completely dead. They had evidently fought and one colony killed the other. A little later I phoned to this same beekeeper again and he said, try it again and put double paper, and I did that, and the result was that although they were not all dead, there seemed to be extremely few bees. What happened I do not know. But I left the colonies to fight it out, and I hope the better colony won. Was this beekeeper right in telling me to do that?

A.—I would not do it. Was it extremely hot weather?

Q.—No; it was in October.

MR. WILLIAM ELLIOTT: I have known the bees to suffocate when a piece of paper has been placed between them. I have united hundreds of colonies of bees by placing a sheet of paper between them. I use any ordinary piece of newspaper, and I have yet to lose my first colony of bees. I do not give them smoke unless I have to.

NOTES FROM THE YEAR'S WORK, 1915.

MORLEY PETTIT, PROVINCIAL APIARIST, O.A.C., GUELPH.

The first event of the year was the Apiculture Short Course held for two weeks in January at the Ontario Agricultural College. Like everything else of a similar nature the attendance was affected by the general depression, increased in the case of beekeeping by the almost total failure of the honey crop. However, there were between 40 and 50 regularly in attendance, and the course on the whole was very satisfactory. Those who came were there for business, and by interest and questions got the full benefit of every session. Judging by correspondence already in, the interest in the 1916 course will be right up to the mark.

The work with the regular College students continues as usual. This consists of a course of twenty-five lectures and a few laboratory periods compulsory with all first year students. It is possible in these twenty-five lectures to briefly outline the elements of beekeeping, and while very little practical work can be given owing to limited accommodation, care is taken to impress the principles of bee nature and management. This year each first year student is given practical work to the extent of making up a complete bee hive, and it is hoped that with improved accommodation in the future this practical work may be extended.

WAX RENDERING.

That large quantities of beeswax are wasted annually for want of proper facilities for rendering it from old combs and scraps cannot be gainsaid. If the beekeeper will carry a 10 lb. honey pail or similar receptacle on his round of apiary work and drop into it, instead of on the ground, all bits of comb, scrapings, etc., he will be surprised at the amount of wax he will accumulate. That this waste of scraps and even combs is only greater in degree than the waste of wax in slumgum through improper methods of rendering may be illustrated by the following account of a typical case.

One hundred and forty-six lbs. of refuse from an ordinary press in the hands of a careful beekeeper was put through a Herschiser wax press, and 20 lbs. of fairly good beeswax extracted. The beekeeper in question stated that at that rate he had been burning in his kitchen stove the price of a good wax press almost every year.

PUBLICATIONS.

During the winter a bulletin on "Natural Swarming and How to Prevent It," was prepared and issued in May as Bulletin 233. This embodies results of co-operative experiments on this important phase of bee-keeping and has been much in demand amongst beekeepers. The Bulletin on "Bee Diseases in Ontario," No. 213, was revised and considerably enlarged. There was also issued a report on "Some Results of Co-operative Experiments on Races of Bees to Determine Their Power to Resist European Foul Brood." These experiments had been conducted co-operatively by beekeepers in the European Four Brood districts since the year 1910, and results indicated that several strains of Italian bees which had been under test, had proved to be quite good resisters of this disease. Resistance is more a matter of vigor than of race or strain. Results of tests show, however, that common black bees are exceedingly poor resisters, and that Carniolans are not generally as good as Italians.

APIARY INSPECTION AND DEMONSTRATION.

The inspection of apiaries was carried on as usual, after the preliminary conference of apiary inspectors held at the Ontario Agricultural College early in May. While marked progress is being made in the control of American Foul Brood, European Foul Brood is still spreading. It will be seen that the policy of making this primarily an educational campaign is being pursued, by the fact that 60 apiary demonstrations were held during the season, with a total attendance of 1910, an average of 32.

As was stated in the report of last year the value of this work, great as it is, might be increased by establishing demonstration apiaries, particularly in districts infected by disease, where discouraged beekeepers might be shown how bees can be profitably kept in spite of obstacles.

The full report on the inspection of apiaries will be published in the Annual Report, and members will have an opportunity of reading it at their leisure.

SPRING REPORT.

During the latter part of April report forms were sent to a large number of beekeepers in Ontario. These were filled out and returned, and the following summary of the winter loss, condition of the bees and honey crop prospects for 1915 were taken from them.

Nine hundred and ninety-three beekeepers reported 37,317 colonies in the fall, and 31,310 colonies in the spring, an average of 31.5 colonies each, spring count, and showing a winter loss of 16.1 per cent. It was found by later reports, however, that in many parts of Ontario from 50 to 75 per cent. of the bees had died. This heavy loss was largely due to the unfavorable breeding season of 1914, causing many colonies to go into winter quarters with large numbers of old bees, also to the poor quality of the stores causing granulation and dysentery or starvation. In districts where much sugar syrup was fed in the fall the loss was comparatively small. It seems that either the wintering problem has not been entirely solved, even by the specialist, or he is not putting all his knowledge into practice.

THE HONEY MARKET.

In spite of this heavy winter loss and the season not being very favorable in many parts of the Province, the honey market in Ontario has been perhaps more unstable than it had been for a number of years. This is probably due to several causes. First, the beekeepers lost their nerve over the large crop of 1913, and have not regained confidence in themselves nor in the report of the honey crop committee. Then conditions are somewhat unsettled on account of the war, and wholesale houses generally are carrying exceedingly low stocks of all kinds of goods, honey included. This slowness on the part of wholesale grocers to purchase honey has caused still more uncertainty amongst beekeepers, and led many of them to sacrifice their crops, some selling as low as 8c. a lb., although the honey crop committee, for the very best of reasons, set the lowest wholesale price at 10c. So we find that beekeepers have sold their honey all the way from 8c. to 12c. per lb. wholesale, for no other reasons than that some beekeepers are better salesmen than others, and some have risen above the old wornout theory that honey is only a luxury and can never become a staple.

SELLING HONEY.

When it comes to selling honey Canadian beekeepers have several marked advantages over all others. The first of these is perhaps the fact that the majority of the honey produced in Canada is, as a dessert article properly handled, equal to the highest priced confections, and equal, if not superior, to any other table honey produced in the world. Second, the Canadian market for this honey has scarcely begun to be developed, as witness the fact that honey is almost never found on the tables of public or private dining rooms outside of the homes of beekeepers and their immediate friends or relatives. Third, the Canadian market is protected by an import duty of 3c. per lb., plus 7½ per cent. *ad valorem*. Doubtless other advantages could be named.

But unfortunately, the sale of honey is handicapped in several ways, not the least of which is the prevalent idea fostered by pessimistic beekeepers that honey is a luxury, and never will be a staple. That this idea is quite unfounded is proven by the fact that honey is a sweet with a positive food value, coupled with the other fact that human beings crave sweet and require food. Another handicap to the sale of honey is the utter absence of any effort to call public attention to honey as a food. I mean advertising. There is a trite saying that "If your business is not worth advertising, advertise it for sale." The usual objection to advertising is that if I advertise my honey I may help the sale of the other man's honey. While this is at least a very selfish view, it is also an erroneous one. The point is to have your own brand of honey with the name on the package and in the advertising.

A third handicap to the sale of honey is the lack of pulling together on the part of beekeepers, and on the other hand the lack of confidence in self and product. For instance, in a certain neighborhood, not a hundred miles from Toronto, honey had been retailing at 10c. a lb. A member of the Association in that neighborhood had the temerity to raise the price to that recommended by the Association. His neighbor beekeepers seeing the advantage raised their price, but not to that asked by their leader, but to just 1c. below him. What was the result? They secured the benefit of his increased price, but injured the sale of his honey and turned public sentiment in the neighborhood against him as being responsible for the general increase in the price of honey. I would not like to believe that any beekeepers are intentionally malicious, but frequently their actions in local honey selling have the same results as though they were. My answer to the complaints of such cases which frequently come to me always is, why not get together and buy out the man who is anxious to sell cheap; but almost invariably I find that the beekeepers are afraid. I would not say they are cowards, but they lack confidence in themselves as salesmen and in the honey as an article to be sold.

We have so often been told of the great Canadian West as a market for our honey, that it seems superfluous to mention it again. Many beekeepers throughout Eastern Ontario are practically ignoring the local demand for honey, because of the under-cutting of neighbor beekeepers, and are shipping west to regular customers at good prices.

QUALITY FIRST.

Marketing unripe honey is another serious handicap. Some beekeepers are not properly equipped with hive storage for honey. No good colony should in an ordinary season have less than two supers, and perhaps best results are obtained by having sufficient super room for the whole crop. This gives the bees time to ripen properly the honey before it is taken from them. It should then be stored in sealed containers as soon as possible. Honey extracted unripe or left exposed to damp atmosphere for any length of time, fails to granulate evenly and starts fermentation usually before it reaches the customer. I have seen a whole crop of extracted honey granulate in 5 lb. pails where every pail had a half-inch of liquid on the surface—a most uninviting appearance to say the least. This was where the beekeeper had only one super for each hive, and was under the necessity of extracting much honey that had never been capped.

BEST HONEY PACKAGE.

The style of package is another important matter. The West seems to prefer granulated honey, while the East, particularly the city consumers, prefer it in a liquid form. During the extracting season the beekeeper is under the necessity of deciding which market he will seek with his honey. If his honey is to go West, he must decide again whether it is for the city or country trade. For the city trade 2½ and 5 lb. pails lithographed are preferred. For the Western farmer trade, the 10 lb. pails are almost the exclusive package. If for local or Eastern city trade, the 60 lb. tin is probably the best. These should be liquified, the honey strained and filled into the selling packages as it goes out to the local dealers or consumers, making sure that it reaches the consumer in a clear liquid state.

There is a bottling business growing up both in the West and in the East. A firm in Winnipeg is buying honey in bulk for bottling, and there are several firms in Toronto and Hamilton, and other eastern cities that are doing the same. I am advising them to purchase in barrels as being the cheapest and most easily handled package. I consider that far too much first quality clover honey is going into 60 lb. tins. If the market were properly developed it would not be necessary for any of our best clover honey to be used in any way except as a table honey. Much of that which goes into 60 lb. tins at present has to be sold to manufacturers to be used where cheaper grades of honey would answer. This is perhaps one of the greatest causes of the low price now offered for honey in 60 lb. tins.

I am not quite sure that wholesale grocers and commission men are the right people to handle honey at all. Honey is rather unique in that it is not perishable, and yet it is perishable. It will keep almost indefinitely, and at the end of that time it is likely to be spoiled, or if it is not spoiled the one who undertakes to liquify and get it into selling packages for the consumer may spoil it. The wholesale grocers to-day are not particularly satisfied with the honey business, and might not object so seriously if they were relieved of it.

Some methods of the Tri-State Honey Exchange of Minneapolis, Minnesota, are worthy of consideration. Honey is purchased from members or other beekeepers at a low wholesale rate. It is bottled and sold and the profits divided amongst the members. The retail stores of the city are canvassed periodically by a man with a light motor truck. He takes with him a stock of bottles of freshly liquified honey, bearing of course the label of the Tri-State Honey Exchange. Where the grocer already has a stock of their honey, he looks it over and picks out any bottles which show granulation replacing them with bottles which are freshly liquified. He also of course, sells more to those whose stocks are low. By this means a constant supply of honey in the best of condition is on the counter of all retail grocers in the city. The name of Tri-State honey gets to be known. It is always the same, flavor, color and everything, so that when a woman buys one bottle of Tri-State honey she knows it will be just the same as the last bottle she had. The experience in Minnesota is that wholesale grocers are giving up the honey business entirely, and it is working into the hands of the Tri-State Honey Exchange. The consumption of honey is being greatly increased, and the honey business is on a much better basis than ever before. Of course, the secret of success of the Tri-State Honey Exchange is that they have a very capable manager who understands business, honey, and men. The only way this could be worked out in Toronto or any other place, would be either by the private enterprise of some one who has sufficient capital and ability to carry it through, or by the co-operation of a number of beekeepers with confidence, first in themselves, then in their honey, then in one another.

For the success of such an undertaking it would be necessary to have an all year round supply of honey. The theory that honey can only be sold in the fall is only a notion which could be overcome by educative advertising and by having a stock constantly on hand. The Dominion Government is spending thousands of dollars advertising fruit, yet I have not heard that any body of beekeepers has approached them with reference to advertising honey. Of course, the trouble is that most beekeepers are unable to sleep if they see the approach of winter and still have any honey on hand: so the dealers get it early at their own price, and then it is too late for the producer to reap any benefit from advertising.

EXTRACTING MACHINERY.

Extensive tests have been made of appliances for taking extracted honey. Reference has already been made to the importance of having sufficient extracting supers to contain the season's crop. From years of experience I have found it most satisfactory to leave the white honey with the bees until they are practically done gathering. Then by having the right kind of machinery for rapid work, extract as quickly as possible returning the empty combs for any dark honey that may be gathered later. The beekeeper soon learns to know his locality, so as to get this work done in time, and at the same time not too soon to avoid having the white honey darkened on the one hand and having a lot of white honey left to be mixed with the buckwheat on the other. If after waiting as long as it is safe there is still unripe honey in the supers, it is better to return these to the hives to be filled with buckwheat than to extract unripe honey and thus lower the grade of the white honey crop.

For taking off the honey it has been found that the bee-escape is most satisfactory. If there is no brood in the super ordinary Porter bee-escapes placed in boards will practically clear the supers of bees in a short time. Where spacing is not very good in the supers, or where the bees have been crowded for room so that burr-combs are built, it is well to loosen the supers breaking the burr-combs a few minutes before going around to put on the escapes. This will cause the bees to take the honey from the burr-combs and avoid much dripping and daubing when the escape boards are put on.

For rapid work the beekeeper should have enough boards to put under as many supers as he would extract in half a day at least. Starting at the end of the row these should be put under every super in succession. Then as the first escape board is liberated by removing the super that board should be put on the next hive at the end of the line beyond the boards that are in place. The second board when liberated should immediately be put under the hive beyond the first, and so on. Even if the bees are not all out when we start to remove the first super they will be so subdued by their separation from the brood and by their confinement in the super that they will fly out as soon as liberated and may be easily driven off the combs.

For taking in the honey a wheelbarrow should be provided, or if the ground is sufficiently level a hive cart carrying several supers at once. The beekeeper should on no account carry supers of honey to the honey house, as human strength is too valuable these days to be wasted in that way.

The honey-house should if possible be provided with an ante-room into which the supers of honey are first carried and stacked in front of a window with screen and bee-escape. If the supers are piled loosely here the few bees that come in on them will soon fly to the window and go back home. They can then be carried into the extracting room, practically free of bees.

All windows should be provided with screens, but there should on no account be any screen on the door, as bees soon learn to hover around the screen door following in every time and causing trouble.

For uncapping I have found the most satisfactory knife to be one with a straight blade 10 or 11 inches long. I do not know of any honey knife on the market with a blade long enough for satisfactory work on Langstroth combs. If one or two inches longer than the width of the frame, which is 9⅛ inches, the skilful operator can uncap one side of the comb practically at one stroke. The shorter blade with which the manufacturers provide us, makes it necessary to go over the side of the comb twice taking about twice as long. The bent shank of the Jones or Bingham knife, is according to my experience quite unnecessary and only tends to tire the wrist. By standing the Langstroth frame on end and using a knife with a sufficiently long blade and the handle straight with the blade, having this blade heated either by the steam jacket or by previously dipping it in hot water, one can do such rapid work uncapping that any attempt to invent an uncapping machine seems quite superfluous. It is necessary of course, that combs in supers be spaced wider than they would be in brood-chambers to get them nicely bulged for uncapping.

To receive the cappings there has not been anything invented yet to equal the Peterson Capping Melter. This machine presents a flat surface slightly sloping and heated by a hot water jacket underneath. The cappings have begun to melt when they fall from the steam-heated knife onto this hot surface and immediately start sliding towards the lower end where they run off liquified into a wax and honey separator. The melter is kept hot by means of a gas or gasoline stove, and of course, care is necessary to see that the water is not too hot. In fact, it is not necessary for it to boil at all, although a little boiling will not injure the honey seriously as it gets away from the surface so rapidly. The operator requires a scraper to help the melted cappings along towards the outlet occasionally, and although some refuse is inclined to accumulate it is all pushed off and no effort is made to clear it from the honey and wax until it gets into the separator below.

This separator is made of an ordinary clothes boiler with a partition across one end reaching from the top to within an inch of the bottom. As the boiler fills up with wax and honey, the honey runs under this partition, leaving the wax in the larger compartment and nothing but honey in the smaller one. Near the top of the smaller compartment a spout opens into a connecting tube running into the extractor, and from this spout the honey which has been separated from the cappings flows back into the extractor and mingles with that which is being thrown from the combs. It is quite true that if this honey were all kept separate an expert would be able to detect a flavor of the wax, but with ordinary care there is practically no change of flavor due to overheating, and when the small quantity of honey from cappings is mixed with the large quantity thrown from the combs, it is impossible to detect any taste of wax in the article which is prepared for market. At the end of the day's work any honey remaining in the separator is drained out to avoid its being injured by remaining in contact with the hot wax over night. The next morning there is a cake of wax to come out of the separator which will need to go through a wax-press to be in shape for market, but there is absolutely no spoiled honey and no boxes or barrels of cappings to sit around in the way waiting for some convenient day to render them up. I consider the Peterson Capping Melter one of the most important inventions that have been given to beekeepers in recent years.

It hardly seems necessary to dwell on the importance of the power honey-extractor, although I think some beekeepers are making a mistake in putting in four-frame and six-frame extractors to be run by power when they might as well go one better and make it an eight-frame extractor while they are at it. Aside from the saving of strength and labor, the power extractor gives you an evener motion and will continue revolving the combs as long as you wish. A mistake made by some beekeepers is not turning the combs long enough. It is probably true that whatever honey is left in the combs is wasted, and perhaps injures the bees by their gorging it when the combs are put back into the hives. After going to the expense of getting a power extractor and getting the combs from the bees, uncapped placed in the machine, and in motion, it seems but a small matter to allow them to run a few moments longer so as to take out practically the last drop. One good expert uncapper with proper knife heated, and combs nicely bulged, will just about keep an eight-frame machine going.

For taking the honey from the machine two methods may be considered, namely, by gravity or by pump. Where the extracting house is on a side hill it is probably best to use the gravity method. Otherwise, the pump is more satisfactory. For best results the pump should be attached directly to the engine or power shaft, and not to the gearing of the extractor as is the common practice. It should then be fitted with a loose pulley for throwing it out of gear whenever the honey gets too low in the machine. Some have objected to the pump on the ground that it churns the honey, filling it with bubbles and causing it to granulate sooner. This can be overcome by not allowing the pump to operate except when it is running full of honey.

For delivery of honey from the pump to the store tanks I have found it very satisfactory to use rubber hose. Being flexible it can be handled and put wherever wanted. It is also convenient to coil up and move to an out-apiary. While the pump sold by the A. I. Root Company, gives good satisfaction it does not lift the honey as high as some might want to raise it on occasions. About nine feet is as high as cold honey can be pumped satisfactorily, but of course, this answers all ordinary purposes.

The question of straining honey has always been a live one, and I am not perfectly satisfied with any device that we have tried yet. For ordinary work where great speed is not required, it is a simple matter to strain it through cheese-cloth or linen, but where several thousand pounds a day are being extracted, it is perhaps most satisfactory to use gravity entirely. For this purpose tall galvanized tanks are made about 30 or 32 inches in diameter and five feet high. There should be sufficient of these tanks to hold two or three days' extracting so the honey could stand in them for that length of time, allowing all particles of wax and bubbles of air to rise to the surface. When these are skimmed off the honey is clear enough for all purposes except fancy bottles. Honey for bottling should always be thoroughly heated and strained just before putting into the bottles so that any particles of wax which did not rise to the surface in time to be skimmed off will be taken out by the strainer at the time of bottling, so that for the extensive beekeeper the gravity clarifier allowed sufficient time to do its work has no serious objections.

Mr. Couse: Not more than a year ago, I went into a leading Toronto hotel, and they had not any honey on the bill of fare. I thought there is no reason why they should not have honey for their guests, and I spoke to the manager and he said, "I cannot put it on at the price we charge for meals." And I said, "What about extract honey; you can get it; you can get two or three pounds of honey for the price of a pound of butter. I will give you a can and you can try it." Of course I expected to sell them honey. I gave them a can of nice honey, and they tried it, and they have had it on their bill of fare ever since, but I have not sold them any honey. However, it shows you that you have got to introduce your product.

Mr. Pettit: Mr. Couse is emphasizing the point that I want to make. I am blaming the beekeepers for not advertising the honey and letting the people know that they have it for sale like any other manufacturer does with his products.

Mr. J. F. Dunn: I live right near a summer resort where from ten to fifteen thousand people come every day, and you would be surprised if I told you how much honey we sell. There was no sale in the beginning, but we got the hotels and the restaurants to put honey on their bill of fare, and if you can show them that they are going to make something out of it, they will keep it. The best way is to have individual two ounce bottles that they can put on the bill of fare.

Q.—How would you liquefy honey. Supposing I was bottling honey and I bought it by the barrel?

Mr. Pettit: Knock off the hoops and staves, cut the honey up in chunks, and liquefy in the usual way.

Mr. Sibbald: We have not many concerns in Canada, that buy honey in barrels, and I would not advise anyone to put honey in barrels.

Mr. Pettit: There are some Canadian firms who buy large quantities in barrels.

Mr. Sibbald: With honey in barrels you are tied to those few firms. With it in tins you have more customers to choose from.

Mr. Pettit: There is too much honey on the market in 60 pound cans every year, nevertheless, as explained in my paper.

Mr. Sibbald: Yes, and it might be well to put more in ten and five pound cans.

Mr. Pettit: Of course you must be sure of where you are going to sell before you put it up in barrels.

Mr. Chas. Challand, Renton: I would recommend putting a good quantity in 60 pound cans, because if at any time you are asked for 10 pound tins, you can repack it, but if you have too much in small tins, you cannot profitably put it from the small pails into the large ones.

Mr. Pettit: The three objections to putting it in 60 pound tins are first, that the West prefers granulated honey in small tins, second, if you melt it up to put in small tins it does not ship safely, and third, it regranulates unevenly giving an unfavorable appearance. Frequently the beekeepers want me to find a market for their honey, and from my experience, I say there is too much honey going into 60 pound tins.

REPORT ON APIARY INSPECTION AND DEMONSTRATIONS IN ONTARIO, 1915.

Morley Pettit, Provincial Apiarist, O.A.C., Guelph.

Only a few changes have been made in the inspection methods from those reported in previous years. As usual a notice was sent to all beekeepers just before the bees began to fly, calling attention to the dangers from robbing and urging them to move to a bee-tight place all hives whose colonies had died during the winter. To those on the disease list a letter and two report blanks were sent early in May, asking them to inspect their own colonies and send in their report. Where disease is again reported they are asked to send in the second report card as soon as the treatment is completed. Bulletin 213, "Bee Diseases in Ontario," was revised and considerably enlarged. Copies were distributed by inspectors on their rounds.

Two new features were introduced to the inspection work this year. First, a different system of reporting was adopted, whereby the inspector entered his report on a form which already contained some information about the beekeeper he was visiting, such as the number of colonies and particularly previous reports of inspection, and his status as a beekeeper, whether good, bad or indifferent. This gave the inspector the advantage of knowing the class of man with whom he was dealing in case he was in new territory.

The other feature was a system whereby it was expected that bad cases of disease might be treated by the inspector at the expense of the beekeeper. It has always been considered that the inspector could only afford to report disease and give instructions for treating, but could not afford to spend the time to actually do the treating operation. In many cases this has not been satisfactory, so the increased service was suggested with the idea that the beekeeper would be quite willing to pay an ordinary mechanic's wages for the assistance of the inspector.

In view of the vigorous efforts that have been put forth by some of the members of the Beekeepers' Association to have bees taxed in order to increase the amount of money available for the inspection, and also in view of the number of requests that come to the Department for an increased grant for this work, it was expected that the beekeepers would be quite glad to avail themselves of this opportunity. What was our surprise then to find that only $19.60 was collected for this kind of work. The beekeepers in many cases preferred to have their diseased colonies destroyed rather than pay 40c. an hour for the job of having them cured up.

In order to follow up known cases of disease, also to give assistance to those who would most appreciate it, the inspectors were given the names of those who had asked for help or had reported disease in spring reports. With few exceptions all such requests received attention.

While the number of inspectors is about the same as last year, the number of local men has been increased. The following acted as local inspectors:—

James Armstrong, Joel Barlow, Chas. Blake, Jno. Coburn, Alfred Denison, J. F. Dunn, J. H. McCauley, Jno. McKinnin, Jno. S. Schrank, and Warrington Scott.

The following might be called trained local inspectors, as they are at present keeping bees in the districts where they inspect, and have had the advantage of an extended course of lectures on bees, and special training for the work at the Ontario Agricultural College:—

Ernest M. Burke, J. C. Duff, R. A. Fawler, R. C. Fretz, Ray Hunter. Eric Hutchinson, Neil Robertson, H. H. Selwyn, and Wm. A. Weir.

Geo. F. Kingsmill and S. A. Stewart worked directly from the office.

Since the inspection methods followed for American Foul Brood are different from those for European Foul Brood, the following charts showing the work done with the different diseases are given separately:—

EUROPEAN FOUL BROOD.

County.	No. of Apiaries Inspected.	Total number of Colonies in Apiaries.	No. of Apiaries Diseased.	No of Colonies Diseased.
Carleton	106	1,054	50	283
Durham	24	167	12	55
Frontenac	14	461	8	152
Hastings	10	96	3	27
Lennox and Addington	40	493	26	164
Northumberland	30	409	20	69
Peterboro'	14	93	8	39
Prescott	40	661	14	181
Prince Edward	12	241	5	118
Renfrew	4	300	2	14
Russell	22	396	4	67
Victoria	25	579	13	98
Welland	50	417	29	120
Total	391	5,367	194	1,387

AMERICAN FOUL BROOD

County.	No. of Apiaries Inspected.	Total number of Colonies in Apiaries.	No. of Apiaries Diseased	No. of Colonies Diseased.
Algoma	3	41	...	...
Bruce	25	504	10	41
Dufferin	19	227	3	9
Dundas	7	34	2	7
Elgin	27	685	2	16
Essex	35	339	5	12
Glengarry	2	105	...	...
Grenville	12	212	3	9
Grey	31	242	15	51
Halton	31	1,036	4	5
Huron	2	7	...	...
Kent	26	309	1	2
Lambton	41	632	17	202
Lanark	23	250	6	16
Leeds	1	22	...	...
Lincoln	7	95	5	19
Middlesex	21	680	5	13
Norfolk	2	41	1	17
Ontario	16	321	8	45
Oxford	26	269	7	14
Peel	35	1,148	9	62
Perth	20	469	8	18
Peterboro'	14	93	2	12
Simcoe	2	175	1	...
Stormont	2	96	1	2
Victoria	25	579	5	16
Waterloo	28	502	11	15
Wellington	29	268	12	81
Wentworth	26	443	5	13
York	73	1,001	31	224
Total	611	10,825	179	921

About half the apiaries visited in European Foul Brood districts were found to be diseased. In many cases the infection is very slight and is under control, the beekeepers being able to produce a crop of honey even though fighting the European Foul Brood. The percentage diseased is about the same as last year. New territory has been covered as the rapidity of the disease prevents working over the same territory a second year. The beekeepers have been warned of the approach of the disease. They have been advised to introduce Italian stock; their attention is directed to whole areas where black bees have succumbed to the disease and where Italians have resisted. Yet what do we find resulting? In practically all districts, disease must actually make its appearance before it will be seriously regarded. Our policy then must remain unchanged—just working on the border of the infected areas, to diagnose when the symptoms appear and advise preventative measures. From past reports it seems that European Foul Brood will spread in time to all corners of the Province. Not being able to check or exterminate it, does not signify failure for our inspectors; but being able to resist the spread and continue beekeeping in infected areas indicates progress against the disease.

The inspection for American Foul Brood covers the same territory as often as is necessary. The inspector planned his trip from the special requests received. He was instructed to inspect as much as possible while in a neighborhood. Time would not permit him continuing his work too exhaustively. If the grant for inspection work were sufficient, every hive in every foul brood district would be inspected, but with the present means that is impossible. If any territory were thoroughly worked it would be at the expense of another district. While curing one locality another would be rotting.

Last year, owing to the failure of the honey crop and excessive robbing a great increase of disease was predicted. The severe winter loss and spring robbing would tend to increase the disease. Yet the percentage of disease reported is only 5 per cent. above that of last year. Bearing in mind the great attention paid to "special requests"—which were prompted by a suspicion of the disease—and the robbing of last summer and this spring, it is surprising the spread of disease was not much greater. Figures scarcely show the real progress made against the disease, as it is the opinion that even though reports of cured cases are remarkably few, that beekeepers are in a better position to-day to rid themselves of Foul Brood—due to the educational campaign—than they ever were before.

The inspectors have employed various means of travelling. Bicycles, horses and motor cars have all seen service. Where train connections are poor, and such is frequently the case, the motor car is the quickest and cheapest conveyance, and even with good connections for short distances it compares very favorably with train and livery hire. The use of more motor cars would greatly increase the efficiency of the apiary inspection.

APIARY DEMONSTRATIONS.

The summer apiary demonstrations have again been one of the important features supplementing the apiary inspection. This season a special effort was made to have uniformity as far as possible at these meetings. The afternoon sessions of the Inspectors' Conference, held at Guelph, in May, were devoted to demonstrations. One of the veteran inspectors conducted a demonstration before the rest of the inspectors, dealing particularly with the symptoms of the diseases, method of inspecting a colony and giving a colony the first shake for the treatment. His methods of conducting the demonstration were valuable as suggestions for improving the programmes of the summer meetings.

Arrangements for these meetings were started early in the spring. A circular letter was sent to each beekeeper where a demonstration was held last year, asking for suggestions both for suitable places for this year's meetings and also for improvements for the programme. It is gratifying to note that a great many replies contained high words of praise for the last season's meeting and offers of the apiaries for another meeting this year. It has been thought advisable to give all beekeepers the same chance to attend these meetings, so the good things were passed around and new places were, as far as possible, selected.

As winter losses were unusually heavy last winter much interest was anticipated on methods of wintering, etc., so each demonstrator was provided with a small model 4-hive wintering case. The small hives also served to conveniently demonstrate hive manipulations.

The weather of the past season was very unfavorable from the demonstration standpoint. Frequently rain fell on scheduled days for demonstrations and the fine days were too few for the farmers to miss to catch up with their work. On six occasions rain fell all afternoon, compelling the audience to seek shelter indoors. The attendance at these six meetings totalled 82 people. The total attendance at the sixty meetings was 1,910, or an average of nearly 32. That many beekeepers, even when extremely busy at home, continue to attend these meetings season after season, proves the value of the demonstrations.

The following chart shows the apiary demonstrations held in Ontario during 1915:—

APIARY DEMONSTRATIONS IN ONTARIO, 1915.

County.	Place.	Attendance.	County.	Place.	Attendance.
Algoma	Steelton	15	Lennox	Enterprise	30
"	Bar River	45	Lincoln	Beamsville	45
"	Thessalon	30	Middlesex	London	50
Bruce	Walkerton	25	"	Strathroy	30
"	Whitechurch	18	Nipissing	Haileybury	30
Carleton	Stittsville	25	"	Whitewood Grove	20
Dufferin	Grand Valley	30	Norfolk	Renton	75
"	Shelburne	20	"	Walsingham Centre	35
Dundas	Iroquois	9			
"	Mountain	20	Ontario	Claremont	45
"	Chesterville	30	Oxford	Ingersoll	40
Durham	Pontypool	11	"	Norwich	25
Elgin	Malahide	40	"	Thamesford	45
"	Dutton	31	Peel	Cheltenham	52
Essex	Essex	25	"	Bolton	40
Glengarry	Lancaster	13	Perth	Stratford	30
Grenville	Merrickville	17	Renfrew	Hurd's Lake	30
"	Junetown	20	Russell	Cumberland	32
Grey	Owen Sound	25	Simcoe	Allandale	25
"	Flesherton	30	Stormont	Newington	24
"	Meaford	30	Victoria	Fenelon Falls	12
Haldimand	Cayuga	30	"	Little Britain	25
Huron	Clinton	30	Waterloo	Baden	40
Lambton	Wyoming	40	Welland	Fenwick	20
"	Mooretown	27	"	Ridgeway	40
"	Florence	30	Wellington	O.A.C.	50
Lanark	Perth	11	Wentworth	Vinemount	40
"	Hopetown	24	York	Newmarket	35
Leeds	Athens	50	"	Toronto	65
"	Morton	20			
Lennox	Selby	30	Average..	Total attendance	

OUTDOOR WINTERING.

DR. E. F. PHILLIPS, WASHINGTON, D.C.

I spoke to you yesterday on the question of the temperature and humidity in the hive in winter, which is on the line of wintering. There is still the winter problem. Perhaps a few beekeepers have succeeded in solving it for their own conditions. I want to call your attention to what would happen if every man in Ontario who is earning $1,000 per year was taxed to the extent of $166, yet your secretary informs me that the average loss on bees in Ontario is 16 1-3 per cent., that is a heavy tax, showing that there is still the problem of wintering the bees. There was recently issued by the United States Department of Agriculture a bulletin entitled "Outdoor Wintering," and I think I can do no better than give you the contents of this bulletin. There are some things that we can keep on repeating with advantage, especially on outdoor wintering.

There was recently issued by the United States Department of Agriculture a bulletin (Farmers' Bulletin No. 695) entitled, "Outdoor Wintering of Bees," by Mr. George S. Demuth and myself. In presenting this important subject to this meeting, I can do no better than to give the material included in this bulletin, especially since not all present have obtained this publication. It would have been pleasant to prepare a special paper for your association, but since the essentials of the subject have recently been outlined, it would be useless to attempt a rearrangement simply for the sake of assuming originality. I shall omit certain paragraphs of minor importance.

This bulletin contains a somewhat unusual classification of the causes of winter loss, and I may say in advance that I shall be glad to explain any points which have not been made sufficiently clear.

Causes of Winter Loss.

The causes of the death of individual bees or of a colony of bees in winter, barring unusual accidents, are only two in number: (1) Inadequate stores and (2) excessive heat production. The numerous factors usually given in the literature on the subject as entirely distinct fall into these two classes, except for some which are usually given which the authors do not believe to be operative.

Excessive Heat-generation.—At hive temperatures between about 57° and 69° F. a normal broodless colony of bees does not form a cluster, but the bees remain inactive on the combs. When the temperature of the air immediately surrounding the bees (not the temperature of the air outside the hive) falls to 57° F. or lower, they form a cluster and those in the centre begin to generate heat by muscular activity, while those in the outer portion serve as insulators by crowding close together, usually with their heads toward the centre of the cluster. The innermost portion rapidly acquires a temperature considerably higher than that of the air about the bees before clustering was necessary, often going to 90° F. in normal colonies and higher in abnormal ones. The number of bees engaged in heat production increases as the outer temperature falls and the insulating zone is consequently decreased in thickness but becomes more compact. The entire cluster becomes smaller as the outer temperature falls.

If bees can be kept in an environment such that the temperature of the air immediately surrounding them is 57° F. or slightly above, they are saved much unnecessary and unprofitable labor. To the theoretical objection that bees need exercise, it is necessary only to state that the authors have so wintered bees in a cellar as well as outdoors with wonderfully successful results. If bees are kept in a cellar under best conditions the results are excellent, but it is not proposed to discuss this more complicated phase of the subject here. If wintered outside in a packing case with abundant insulation, any heat generated escapes slowly and the temperature of the air in the hive rarely falls below 55° F. If inadequately protected, the temperature of the hive can not be kept so high and the bees must generate much more heat. In single-walled hives it is common for the temperature of the air around the cluster to fall to freezing or lower, in which event the bees generate an excessive amount of heat and perhaps die when they are no longer capable of the necessary muscular activity. The necessity of packing is thus made clear, and in any locality in which the outer temperature often falls to 40° F. or below it is desirable to protect bees to conserve their vitality. If the temperature should fall to 40° F. only a few times during the winter, this would not be serious enough to make insulation necessary. It is obvious, however, that winter protection is beneficial throughout practically the entire United States.

Necessity of Having Young Bees.—Bees may be compared with minute dry batteries, in so far as their vital energy is concerned. They emerge as adult bees with a certain amount of vital energy, and when this is exhausted they die, not having power to recover lost vitality as human beings have. To withstand the hardships of winter under usual conditions, a colony must have many young bees, capable of prolonged muscular work. Obviously the better the wintering conditions, the less necessary it becomes to provide young bees, but even with the most perfect wintering it is desirable that there be plenty of young bees in the fall, so that they will be available for extensive brood-rearing in the spring. This calls for prolonged brood-rearing in late summer. Old bees, which have been worn out earlier and are ready to die, soon succumb from the work of heat-generation.

Danger of Weak Colonies.—In a strong colony many bees in the centre of the cluster may be engaged in heat-generation, and there will still remain many bees to serve as insulators. A weak colony, on the other hand, has less reserves for insulation, and, since heat is rapidly lost, the bees on the inside must generate excessive heat in order that the outermost bees may always be at a temperature of over 50° F. Since the surface of a spherical cluster is proportionate to the square of the diameter, while the volume is proportionate to the cube of the diameter, it follows that a large colony cluster has a relatively smaller surface for radiation of heat than does a small one. Below about 50° F. individual bees become numb, and so long as the cluster remains active the authors have never found normal bees at a temperature lower that the critical temperature, 57° F. In a small colony the inner temperature is often many degrees warmer than that of a neighboring strong colony, which doubtless explains the prolonged brood-rearing of weak colonies in the fall. Most colonies which die of excessive heat-generation are rushed to their doom by the temperature being high enough to start brood-rearing, which is perhaps one of the most unfortunate circumstances which a colony can experience in winter. By all means a colony should be so protected that brood-rearing will not be begun until frequent flights are possible.

Since weak colonies so frequently succumb in winter, it is obvious that a too rapid increase in the number of colonies in summer is unwise. Beekeepers have learned that swarming is to be avoided because of the resulting reduction in the honey crop, and the loss in winter is additional argument against allowing the bees to exercise this instinct freely. It is a common saying among beekeepers that a rapid increase is usually followed by a rapid decrease. It is impossible to get too strong a colony for winter, the error always being in the opposite direction.

Effects of Accumulation of Feces.—It was first shown by the authors that heat-generation causes increased consumption of stores; this in turn causes an accumulation of feces within the bees, which is more rapid if the stores contain a high percentage of indigestible materials, and the presence of feces causes increased activity, often resulting in death from excessive heat-generation. Beekeepers call this condition dysentery if the accumulation is so excessive that the bees are unable to retain the feces. Dysentery causes the death of bees in winter, so far as has been seen, solely by undue activity and excessive heat-production. This detrimental effect is reduced by good stores, but obviously the proper method is to prevent an unnecessary accumulation of feces by preventing a heavy consumption of stores, chiefly by providing a sufficiently high surrounding temperature. Honey-dew honey is especially injurious because of the rapidity with which feces accumulate.

In mild climates, in which there are frequent days when bees can fly and rid themselves of feces, the injurious effects of poor stores are less noticeable, because the feces do not accumulate sufficiently to cause abnormal activity. The accumulation of feces is to be considered as an irritant, causing responses similar to disturbance by jarring or exposure to light.

Influence of the Queen.—In discussions of wintering it is usually stated that to winter well a colony must have a good queen. Obviously a good queen will better prepare a colony for winter by providing a strong colony of young bees than will a poor one, while a colony that is queenless in late summer and fall has little chance of living until spring. A good queen will also increase brood-rearing rapidly in the spring, if the colony has good stores and has been properly protected during the winter. Aside from the important influence on the population of the colony, the queen probably plays no part in wintering.

Spring-dwindling.—If the individual bees of a colony are reduced in vitality by excessive heat-production, they may live until spring, but are unable to do the heavy work then needed to bring the colony back to full strength. The adult bees die more rapidly than they are replaced by emerging bees, and the population decreases. This condition, which can be produced experimentally, has long been known among beekeepers as "spring-dwindling." If this condition is observed, the bees may perhaps be slightly relieved of further unnecessary work by packing to conserve heat and by giving abundant stores, but the proper treatment is to prevent the condition by proper care in the preceding fall and winter. The term "spring-dwiindling" should not be applied to death of bees from other causes.

Lack of Stores.—A common cause of the death of colonies in winter is starvation, which is more certainly due to carelessness on the part of the beekeeper than is unnecessary heat production. The greater the necessity for heat-production, the more necessary it becomes for every colony to have an abundance of stores of good quality. The amount required varies with the length of the winter, and also with the amount of heat which is generated. It is, of course, necessary also to provide or leave stores enough for brood-rearing in late winter or spring, before sufficient stores come to the hive from natural sources.

Comparison of the Colony with a Furnace.

Let us assume that we have a furnace for heating a building so constructed that ashes may be removed only when the temperature of the outer air is warm. If the house has thin walls and many openings, the furnace can not maintain a high temperature in extreme cold weather, the amount of fuel consumed is increased, the ashes accumulate rapidly and clog the furnace, and in a desperate effort to raise the house temperature we should probably burn out the furnace. On the other hand, if the house is well built and heavily insulated, a low fire will suffice, and as a result there will be a minimum amount of ashes. The better the fuel, the less the amount of ashes in either case.

It is permissible to compare a colony of bees as a unit of heat-production with this furnace. If the bees are in a single-walled hive in a cold climate, the colony must generate a great amount of heat, must consume much more honey, and feces will accumulate rapidly. As the bees are unable to discharge their feces until the temperature of the outer air is high enough for flight, the "furnace" is clogged. The bees are "burned out" by the excessive heat-production, and, even worse than in the case of the furnace, the irritation resulting from the presence of feces causes still more heat-production. On the other hand, if abundantly insulated, the heat generated is conserved, the consumption of stores and amount of feces are reduced, and the bees can readily retain the feces until a flight day, in any place in which bees can be kept. The better the stores the less the amount of feces in either case.

We should not expect much of a furnace in an open shed, and we have no more right to expect good results from a colony wintered in a thin-walled hive in a cold climate, or even in a better hive placed in a windy location.

Conservation of Heat and Reduction of Expenditure of Energy.

In outside wintering the heat produced by the bees is conserved by the insulation of the cluster itself and also by the insulation of the hive and packing. In the cellar there is less insulation near the cluster, but the cellar itself replaces the packing, and is in reality simply an insulation. The insulation of the individual hive, of several hives packed together, or of bees in a cellar serves solely to reduce the loss of heat generated by the bees.

The amount of packing that should be used abviously varies with the climate and it is impossible to make definite general statements in a bulletin intended for all parts of the United States. There is one general statement which can be made with safety: The majority of beekeepers do not give sufficient insulation and no beekeeper ever gave a colony too much. The aim of the beekeeper should be to keep the air about the bees at about 57° F., at which temperature there is no condensation of moisture within the hive, even on the inside of the cover, where it first appears. It might be inferred that if double the amount of packing had been used the temperature of the air about the bees would have been too high. This is not the case, for bees cease heat generation when the temperature reaches 57° F., (or even sooner when the surrounding temperature is rising), and the temperature will not exceed 57° F. unless that of the outer air remains higher than that for a considerable period.

Bees well protected and with good stores do not fly from the hive because of the warmth within when the outer air is too cold for them to do so safely. If bees fly at low temperature (45° to 50° F.), it is an indication that they need a flight because of an accumulation of feces from poor wintering, and does not at all indicate too high an inside temperature because of too much packing. In conclusion, the beekeeper cannot apply too much insulating material to a hive.

It has been found that, even with abundant insulation, the temperature within the hive and outside the cluster is greatly reduced if the packing case is exposed to wind. During the winter 1914-15 a record was kept of wind velocity directly over a heavily packed case (with entrances ⅜ inch by 8 inches), and it was found that a wind with a velocity of 20 miles per hour directly on the case reduces the temperature within the hives practically to that observed in an unprotected hive. The beneficial effects of the insulation were therefore nullified, and the proper temperature within the hive was not regained for several days unless the outer temperature rose considerably. Beekeepers have long emphasized the importance of protection from wind, but the results observed were much more pronounced than was anticipated or than has ever been suspected by practical beekeepers. The ideal toward which the beekeeper should work is to keep his colonies during cold weather absolutely protected from wind, for here again the protection can not be too great. It is entirely erroneous to assume, as some have done, that such protection is not essential in well-packed hives.

There are several types of hives on the market in which the insulation is built in, to be retained throughout the year. There is no objection to the packing in the summer,, except that such hives are not convenient for moving and in some other manipulations. Insulation in commercial double-walled hives is by means of air spaces or insulation, such as sawdust, chaff, broken cork, or shavings. These hives are better for outside wintering than single-walled hives in any part of the United States, but they do not provide adequate insulation of temperature below about 40° F. Such hives must, of course, be protected from wind, or they are for the time being no better than single-walled hives.

TYPES OF INSULATION.—Various materials are used for insulation. Besides those named above, paper, dry leaves, and many other substances are in use. Most of the common insulating materials depend on small confined dead-air spaces for their insulating value, and, in general, the more finely divided the air spaces the more efficient the material. Sawdust is usually condemned, because if moisture escapes from the hive into the packing it is retained and the insulating value is reduced. However, if a colony is sufficiently packed, moisture does not condense, except possibly at extremely low external temperature, and this objection to sawdust is removed. From observations so far made, it appears that the beekeeper may use the materials most easily obtained. If dry leaves are used, they should be packed tight, but sawdust should simply be poured in place without being packed tight.

THE ENTRANCE.—The weak place in hive insulation is the entrance. An opening 8 inches wide and ⅜ inch high is abundant, it usually being constructed as a tunnel through the packing. In cold weather this might be still further reduced. The opening should be shielded from the wind, to prevent a rapid loss of heat, for if the wind blows against the entrance the heat stored up in the packing is lost both to the outside and the inside. The only reason for an entrance as large as the size mentioned above is the danger that dead bees will drop from the combs and block a smaller entrance. Since the number of dead bees is greatly reduced in well-insulated hives this is less important, and, furthermore, if the air within the hive is warmed to 57° F. the dead bees will be pushed outside, even in freezing weather.

METHOD OF PACKING.—The exact method of packing is not especially important, provided enough insulation is given on all sides. Colonies may be packed singly in any sort of box, or they may be packed in groups of four. Some beekeepers arrange colonies in long rows and apply insulation to the whole row. The placing of several hives in contact has the advantage that the colonies insulate one another. If arranged in groups of four, two facing east and two west, they may be left on the same stand throughout the year and are readily manipulated during summer. If in long rows close together, summer manipulations are impeded, unless the hives are moved after the insulation is removed. Placing colonies in long rows is therefore not advisable. Whatever type of outer case is used, it should be tight, to prevent rain and snow from wetting the insulating material.

A rather common practice is to pack the hive at the sides, top, and rear. but to leave the front unprotected and faced to the south, the object being to utilize the heat of the sun to warm up the interior of the hive and reduce the work of the bees. Any place through which external heat may readily reach the interior of the hive is also efficient as an avenue through which heat may be lost when the sun is not shining. Since the sun shines less than half the time in winter, making no allowance for cloudy days, the weakness of the argument for this practice is obvious. A similar practice is to paint the packing case a dark color to absorb the sun's heat. Considerably more detailed work is needed to determine to what extent this source of heat is of value to the colony.

TIME FOR PACKING.—At the time of the first killing frost the beekeeper should promptly remove supers, if any are on his hives. If the bees are not adequately supplied with good stores for winter these should now be given immediately, and, when the feeding is finished, the winter insulation should be applied at once. At this time bees are the quietest of any period of the year. The disturbance incident to putting on the insulation does not do them any harm. After this the beekeeper should have no occasion to open the hive until spring. An outer temperature above

60° F. is desirable at the time of packing, especially if no brood is present. Any day when bees are flying is suitable.

If packing is delayed until late it may do far more damage than to leave the bees unpacked. A colony of bees that is generating heat in response to low temperature is considerably disturbed by the manipulations during packing and the temperature of the inside of the cluster is promptly raised. Frequently, if bees are packed too late (when it is too cold outside), the cluster temperature is raised to brood-rearing temperature, the queen begins to lay eggs, and brood-rearing is usually then continued throughout the winter, unless it results in the death of the colony, as is often the case. Many beekeepers pack their colonies in December with most harmful results. There is probably no place in the United States where packing is needed in which it is safer to wait later than Thansgiving Day. Since more beekeepers make mistakes here than in any other phase of outside wintering, this should be emphasized most strongly. The authors have succeeded on several occasions in starting brood-rearing in December by manipulation, both in colonies wintered outside and in removing bees to a cellar, and it is certain that such winter brood-rearing is highly injurious to the colony.

Time for Unpacking.—If a colony has a good queen and plenty of stores and is well packed, the beekeeper rarely has any reason for opening the hive until spring is well advanced. If he is not sure of the condition of the colony, he may wish to examine it earlier, but this first examination should be brief and the packing may be partially removed and replaced afterwards. If there are any queenless colonies or any colonies short of stores, these defects should, of course, be promptly corrected, after which the colony should remain undisturbed until, as the season advances, frequent manipulations are necessary. It is often best to leave the insulation on until the colonies need more room, which will probably be as late as May 15 in the north. Colonies which have wintered poorly need their insulation longest, while colonies that have been well insulated, either in a cellar, or outside, can, if necessary, stand considerable exposure without much damage, although the work of heat-generation thereby reduces the energy available for building up the colony rapidly.

The time for removing packing may be still further delayed by wintering a colony outside in two-hive bodies, the upper one being well supplied with honey. Since there is more space to keep warm, such a hive should be more thoroughly insulated. If the plan is followed, the beekeeper is sure that sufficient stores are available, and he can probably locate any queenless colonies by a brief external examination. Since wintering in two-hive bodies has not been practised extensively, it should be tried with caution, but reports of this method should be available from all parts of the country and beekeepers are urged to try it on an experimental scale. The plan has much to commend it.

Providing a Windbreak.—It is well established that a windbreak of evergreens is superior to a solid windbreak such as a house or solid fence. The beekeeper can readily determine whether his bees are located in a place where the wind rarely or never blows more than five miles an hour in winter. If the apiary is not so located, it should be moved during the summer to a place in the woods, in a gully, or in some other sheltered place. Bees should never be moved in winter. If it is not practicable to move the apiary, a high fence perhaps 8 feet high, should be constructed on the exposed sides. The more compact the apiary, the easier it is to construct a windbreak, which is an argument for placing colonies in groups of four. Evergreens are slow growing, and a high fence may be used until the permanent windbreak is sufficient. If the apiary is practically surrounded by buildings this may be adequate protection, but such a location is usually not the most convenient for the apiary. A southern exposure is usually recommended as best for winter, for it is claimed that the heat of the sun is beneficial. Since the sun shines only a small fraction of the time in winter in most localities, especially in the East, where there is much cloudy weather, this feature should not be unduly emphasized.

Providing Adequate Winter Stores.

The amount of honey that a colony will need from the time it is packed until it is unpacked can not be closely estimated. The aim of the beekeeper in winter should be to save bees rather than honey, and he can make no more profitable investment than to give his bees more than they can possibly use. Some beekeepers claim that it is best to have the old bees die soon, so as to save stores. The actual consumption in such badly wintered apiaries is probably not at all decreased.

If the bees do not have sufficient stores, they may be given combs of honey, but these should always be given before cold weather, so that a proper clustering space may be formed by the moving of honey, since bees always cluster in empty cells of the comb adjacent to stores.

If honey in combs is not available, the bees may be fed extracted honey, but the usual practice is to feed a thick sugar syrup made of 2 or 2½ parts of sugar to 1 part of water by volume. To this syrup 1 ounce of tartaric acid should be added for each 40 to 60 pounds of sugar while the syrup is being heated to the boiling point to dissolve the sugar crystals. The syrup should be boiled 15 minutes. The acid helps to invert the cane sugar, thus retarding its granulation in the combs. If there is any question as to the quality of the stores, it is a good practice to feed about 10 pounds of syrup at the time of packing, in addition to the stores provided earlier, this being stored immediately above the cluster. It is thus used first, and an accumulation of feces does not occur so long as the bees use only the sugar syrup. There is, however, no better food in winter than a good quality of honey. As was stated earlier, honeydew honey causes a rapid accumulation of feces, resulting in dysentery. If this is present in the fall, it should be removed and better stores given. Some fall honeys are singularly injurious, but their injurious effects may be reduced by feeding syrup at the time of packing.

Summary and Conclusions.

Bees need protection from cold and wind in winter practically in all parts of the United States. The beekeeper should give abundant insulation, since it is impossible to give too much and since most beekeepers give too little. Great care should be exercised to protect colonies from wind. Every colony should be strong in the fall, so that heat may be generated and conserved economically. To reach the proper population a good queen is necessary.

Many colonies die of starvation in winter. This can easily be avoided.

The beekeeper can make no better investment than to give his colonies proper care for winter.

If the excessive winter losses are prevented, commercial beekeeping will be greatly benefited. Such a condition is entirely possible when beekeepers come to understand the fundamental principle of wintering.

Mr. H. G. Sibbald: The paper that has just been read is in accord with most of the experiences that I have had. However, I just wish to take exception to one thing. I never use tartaric acid. I used to boil the syrup. I simply boil the water now and stir in the sugar. That is very much quicker and you can feed the syrup in a half hour after it is mixed. You can put a bag of sugar into the water and take it out to the yard and feed it, it makes quite a difference in the work.

JNO. A. MCKINNON, St. Eugene: I feed considerable sugar each year. I always buy cane sugar in barrels. I used granulated sugar for part of my supply last year, and I used tartaric acid and some honey. When the tartaric acid was not used in sufficient quantity the syrup granulated and the bees starved. It might be well to utter a word of warning against using clear sugar syrup unless it is perfectly melted. If there is the least bit of sugar left in it it will granulate and the bees will die. I have no disease in my yard and I use some honey in the syrup.

MR. J. F. DUNN: I have fed sugar syrup for a good many years, and I almost always use tartaric acid. It saves the bees a lot of trouble inverting the sugar. Dr. Phillips said that the chief objection to the double-walled hive was the weight, and he is right. I have double-walled hives that have been in use for eighteen years, they are made of three-quarter inch lumber. Take a hive made out of three-eighths lumber and lined on the outside of the inner wall with asbestos paper, and the inside of the outer wall with a good quality of building paper, and leave an inch or inch and a quarter of space packed with good granulated cork and such a hive only weighs eighteen and one-half pounds; I can hold it out on my hand. It makes a good hive and there is no packing to do. The cover is packed with two and one-half inches of granulated cork and several thicknesses of building paper. Somebody said it was hard to winter a small colony of bees and I agree with him. I am wintering this year, because they have good queens, a few small colonies. I reduce the size of the brood-chamber. I use dummies, and I give a larger entrance than most people. I do not allow any upward ventilation. Nothing but paper on top of them and then pile on the planer shavings, and you can winter a small colony in that way. I am wintering a number this year just with burlap on top and planer shavings over that. I pack with cork dust and they are not affected by the outside temperature.

MR. WM. ELLIOTT, Adelaide: I have fed hundreds of pounds of granulated sugar, and I never use any tartaric acid and I never have any granulation. My friend says he always buys sugar by the barrel. I buy it in bags. All the sugar comes from the same source, whether it is in bags or barrels.

MR. MCKINNON: I feed granulated sugar. I have used tartaric acid, hard water, and rain water. I have examined my bees closely for at least four years. I find the tartaric acid won't keep the syrup from granulating. I don't know whether the location has anything to do with it or not, but I find it will candy in my yard six or seven days after it is fed. That is if I feed it up to twenty pounds at one feeding. I picked out some of the candied stuff in one of the feeders and intended to bring it here to-day but forgot it. It was some that was left over from last year and it was as hard as flint. Sometimes in September it has not that tendency to candy. The style of the feeder may have something to do with it. I feed in ten pound tins. I don't know whether that has anything to do with it or not, but one thing I know is that it will candy within three or four days.

MR. J. H. BURKHOLDER: Experience is the best teacher. I have about 150 colonies. I have fed granulated sugar, and I adopt the same plan as described by Mr. Sibbald. For a number of years back I have boiled the water and then pour in the sugar. I have used granulated sugar. It is the same whether you buy it in the barrel or in the bag. I have more water heating at the same time. The sugar will melt almost as fast as you put it into the kettle if the water is boiling.

I stir it until there are no granules of the sugar left and I have never yet seen any of my syrup granulate. I put nine pounds of water to sixteen pounds of sugar. When the sugar is thoroughly dissolved it will not granulate. I use no acid.

Mr. J. D. Evans: I think the great trouble has been that not sufficient quantity of water is used. I notice that if I use 100 lbs. of sugar and 50 lbs. of water some of it will candy. The best way is to use 60 lbs. of boiled water to 100 lbs. of sugar, and be careful to stir it long enough until thoroughly dissolved.

Dr. Phillips: What objection has Mr. Sibbald to tartaric acid? Does it do any harm?

Mr. H. G. Sibbald: No, I do not know that it will do any harm, but I cut out everything that is unnecessary.

Dr. Phillips: Some people do have trouble with granulated sugar, and unless they can get the sugar converted in some other way it will granulate. If you add more water it makes the bees do the work which the tartaric acid does. The bees will invert the sugar the same as the tartaric acid. It is not cane sugar at the end in either case. It is invert sugar. We put on the water and let it boil till we have two and a half parts of sugar to one of water. It will granulate; the crystals are very small. If the bees do not have time to do all this inverting we will find lots of sugar crystals on the hive bottom in the spring, and that is all wasted.

Mr. H. G. Sibbald: If you make the syrup so very thick that you require to add tartaric acid it makes it difficult for the bees to store it, and they will often refuse to store it when they will take the lighter syrup with more water in it. If Mr. McKinnon will put a little more water with his sugar he will find it will not granulate. As to the time it takes for the bees to invert it I do not notice that very much. I feed fifteen pounds to-day, fifteen to-morrow and fifteen the next day, and it will all be stored and the bees will be quiet in a few days. I do not see that it hurts their vitality very much, because when I go out in the middle of April to examine the colonies the queens are just starting to lay and that is an ideal condition.

Mr. Armstrong: I always make my syrup two-thirds sugar and one-third water. I bring the water to a boil and then add the sugar. I pour it in slowly till it is all melted. It is very important to see that it is all melted. I have been feeding for the last thirty years. I have fed in 5 lb. feeders and in 10 lb. feeders and up to 42 lbs. I have a feeder now that holds 42 lbs. I just make one job of it. If a colony wants 25 lbs. I give it to them, and if they want 35 or 42 lbs. I give it to them.

Mr. H. D. McIntyre, Woodbridge: If you feed them rapidly you will find more granulation.

Mr. Blake: I am told by a confectioner that in making rock candy they make a heavy syrup and then put a string in a bottle and the granulation will form around that string. Would that be the reason the syrup granulates because some granules are left in the syrup.

Mr. R. B. Ross: I have a brother who is a crank on candy making. He does it scientifically. He always uses a thermometer, and in making the interior of soft candies for chocolate creams he has got to be very careful. He says that once the sugar is put into the water it should never be stirred. Of course the sugar is boiled and if any little crystals form around the inside of the vessel he removes these with a wet cloth so that they cannot fall back into the boiling syrup. He says that is the great secret of preventing granulation in making candy.

Mr. H. D. McIntyre: I used to feed the syrup mixed 100 lbs. sugar to 60 lbs. of water, and I never could find any granulation. I have a few out yards within about two and a half miles from home and it does not take long to go to either of them. I had a one-horse land roller and I cut a hole in one end of it and I had a funnel made to fit in that hole. Inside of that roller I put 10 bags of sugar and 600 lbs. of water. I hitched a horse to it, got up on the spring seat and when I got to the yard it was ready for feeding. I have since reduced the water to 550 lbs. and it is all right, and I will give you $5 for any granules you can ever find in it. The one horse drew the 1,500 lbs. with about half the effort it would take if it was loaded on a waggon.

Mr. J. A. Marshall, Binbrook: I have a tank and I put the water in and bring it to a boil. Then I stir 300 lbs. of sugar into that water. I keep stirring until I am sure it is all melted and then I let it come to a boil again before I move it.

The Chairman: I want to endorse what Mr. McIntyre has said. He has got us all beaten in the way of making sugar syrup. If I did not know Mr. McIntyre so well I would have thought he was putting something over on us. I have fed thousands of pounds of sugar by simply bringing the water to a sharp boil, and I have never yet found any granules.

MODERN APIARY EQUIPMENT AND BUILDINGS.

William Elliott, Adelaide.

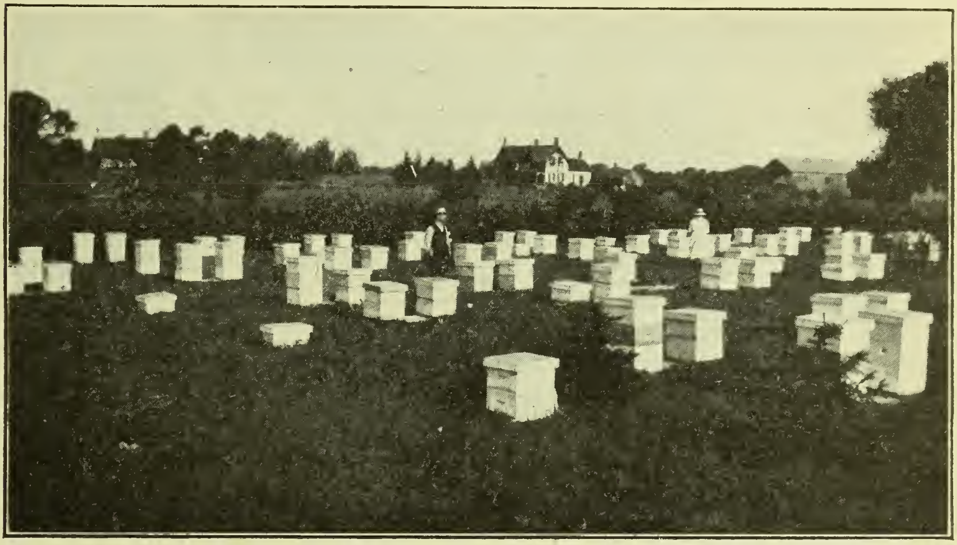
We have three yards and at two of these yards are honey houses and all the equipment that we think is necessary in each. The honey-house at home is 16 by 24 and it is fireproof, all built of iron. It is so constructed that we can run the wheel-barrow into it with the honey that we bring from the bee-yard. The honey is laid right down in front of the capping tank. In the farther end of the house we have a six h.p. engine which only weighs 450 lbs. Two good men can pick it up and carry it. We have a line shaft which we use for the sake of keeping the engine out of the road. From that we have a belt running to the extractor. All the honey is laid down in front of the capping tank, and the operator stands there with a steam capping knife and a steam boiler to operate the capping knife. All the honey is passed to an 8-frame friction-driven reversible extractor. This is a great improvement over the gear-driven extractor. It runs with as little noise as a sewing machine. The honey is pumped up by a pump and delivered into the tanks.

In one corner of the honey house we have a four horse-power steam boiler and that is used for melting the wax. We have had experience for the last three years with foul brood and we have had to melt 500 lbs. of beeswax in the season. This steam process for melting wax is a big improvement on anything I have yet seen. It is equally as good for melting sugar.

In the other honey house we cannot wheel the honey in and it has to be carried in. It is laid down on the floor opposite the operator where it is uncapped and the tank will hold three days' capping. The honey gate is open at all times. From the capping tank there is a pipe into the next apartment. The floor of this apartment is sunk into the ground two and one-half feet and the honey runs by gravity from the extractor into two large tanks. We use here a reversible extractor which is run by a one horse-power engine directly off a line shaft. These two tanks will hold 2,700 lbs. each. The only danger is the overflowing of the tanks, but if you do not have any bigger crops than I have had the last two years that won't trouble you very much. We have a cement foundation under the tanks which is twenty inches higher than the floor. We have a small set of scales and taps that give us no trouble. We can run for a half a day and there will be no dripping. If you can lay out your honey house to advantage so that the honey will run by gravity, and you will not have to use a pump, I think it is the better plan. Honey that is pumped is apt to granulate quickly.

A MEMBER: Where do you strain it?

MR. ELLIOTT: I do not strain it; it all goes into these tanks. There is seldom any wax. Even if you do strain it there will be a certain amount of wax that will go through. The wax all comes to the top and I take it off. I have tried straining through a cheesecloth. I have tried to get a screen sufficiently fine and I have come to the conclusion that the better way is to let it run into the tank and remain there two or three days. Then the wax will rise to the top and I skim it off.



Apiary of Wm. Elliott, Adelaide, Ont.

Next the extracting room we have a steam boiler, and a 500 lb. tank. We put the water into that tank and bring it to a boil by means of steam from the boiler. I generally melt two or three sacks of sugar at a time. The force of the steam going into the water keeps it stirred. I find it is a great saving of time and there is no danger of the sugar burning. I have a workshop in this building and all the necessary tools. I find that for melting wax it is better to have a five horse-power boiler. When the water gets to a boil we keep adding the old combs until it is so thick that we cannot stir it any longer. The wax rises to the top and we have a screen on a hoop so that it bulges half round. We press that down into the refuse and we can dip out 40 or 50 lbs. of wax. We put that into moulds and set it to one side. That does not finish the job because what is left has got to go through a process after that. We have a large tank and we draw the wax and water off together. We throw the day's work into this large tank, and when it gets full we draw off the water from the bottom. We keep piling in the wax until night and by night we will have 100 lbs. of wax in that large tank. We turn the steam hose into that wax until it is all thoroughly melted. We cover it up and it takes nearly three days for it to cool. The sediment goes to the bottom, and it will draw from the sides to such an extent that we can draw the water from the bottom and then by turning it upsidedown we can take off the refuse that is gathered on the bottom.

Q.—What method do you use to get the honey from cappings?

A.—We cannot get all the honey out but by leaving it in the capping box for three days and stirring it occasionally a great deal of the honey will drip out. But there is a certain portion of it left in. You cannot turn the hose directly into that, because if you do you will dilute the honey to such an extent that it will not be saleable. A capping melter is good, but I am inclined to think that it might overheat the honey. Of course there is some loss in the plan I adopt.

Mr. C. E. Chrysler: In melting your syrup do you have to make allowance for the condensed steam?

A.—I measure it out two to one and I allow the steam for the extra.

Mr. Bainard: By using the steam you just add from three to four pounds of water.

Q.—You have never used a press for pressing your capping?

Mr. Elliott: No, I never tried that. I have thought of it a good many times.

Mr. Clarke: I use just an ordinary piano stool screw for the press, and by pressing it you can get every bit of honey out of the wax. Use some burlap so that the cappings won't get out at the sides.

Mr. Armstrong: After running it through a capping melter after you pressed do you find that all the honey is out of it?

Mr. Clarke: I never tried that.

Mr. Armstrong: I have serious doubts about your squeezing all the honey out. I think you will get more honey the other way.

Mr. Armstrong: We have two capping melters here in the exhibit and either one will leave the honey ready for table use.

Mr. Pettit: I would like to say a word with reference to the Peterson capping melter. We are careful not to let the water boil in the melter. The honey goes right in with the rest and the percentage of heated honey is so small compared with the bulk of the honey coming from the extractor that the change in flavor is not noticeable.

A Member: What about the color?

Mr. Pettit: It does not affect the color.

Mr. T. J. Colwill: To what temperature do you raise the water?

Mr. Pettit: We have the melter over a gasoline stove. If we find the water beginning to boil we turn the flame down a little.

Mr. W. A. Chrysler: How is the honey taken off the hive?

Mr. Pettit: With bee-escapes.

Mr. Chrysler: If you use too much smoke the honey will have a smoky flavor.

Mr. Elliott: I have been using a ventilated bee escape board for twenty years with a good deal of success. I use a double screen, one on each side seven-eighths of an inch apart. I tried it with a single screen in the first place, but found that the bees would feed honey through the single wire to the ones above or below. I found that the double screen was very successful. I used two escapes in each board in case one might get clogged. When I manufactured these I also had another object in view. I believe in cleaning out my super-combs at the end of the honey season. At first I set them outside in the evening so that the bees would start and clean them out in the morning but there was always an uproar and my horses were in danger. I found by setting this on top of the colony of bees, piling them five or six high, and then drawing this slide so that the bees could get up through the opening and clean them out. Usually in two days' time they would be cleaned out. I have used that method for twenty years.

A Member: What is the quickest time that they will clean out a super?

Mr. Elliott: I have seen them all cleaned out in twenty-four hours. I place five or six empty supers on top and allow the bees to come from the bottom and clean it out. We generally allow forty-eight hours, and by that time we will find them all cleaned out.

REPORT OF COMMITTEES.

J. K. Darling—In Memoriam.

Moved by M. B. Holmes, seconded by F. W. Krouse: "Whereas this Association since its last meeting in Convention has learned of the death of J. K. Darling of Almonte;

"And whereas, the late Mr. Darling was for many years an active and honored member of this Association, occupying, as he did, the various posts of director, vice-president and president with great credit to himself and with lasting benefit to this Association;

"And whereas this Association bows in sorrow on receipt of the sad intelligence that we shall meet our friend and co-worker no more in our assemblies, nor feel the warm grasp of his hand in friendly greeting again on the shores of time;

"Therefore, be it resolved, that the Ontario Beekeepers' Association in Convention assembled, take this the first opportunity of giving a united expression of sorrow, and that the sincerest sympathy and condolence of this Association be tendered the widow of the departed as she sits in the shadow and gloom pervading her home and longs for the touch of the vanished hand and the sound of the voice that is still. And we unite in the hope and expressed prayer that the consolation promised by the Master of Assemblies may be fully exemplified in this sad bereavement.

"And be it further resolved that this resolution be engrossed in the minutes and a copy be sent the widow and family of the late J. K. Darling at their home at Almonte."

Carried by a standing vote.

REPORT OF HORTICULTURAL EXHIBITION COMMITTEE.

Mr. W. Couse presented this report as follows: Up to the time we learned that the military were going to occupy the exhibition buildings we fully intended to hold an exhibition this year. We worked up almost to the last and then found that we could not get the buildings. That was one reason why there was no exhibition this year. Another reason was that they did not secure more than a twenty per cent. apple crop this year, and Mr. Hodgetts felt that the exhibition would not be very big, and taking that along with the fact that we could not get a suitable building, we decided that we would discontinue the show for this year. The intentions are to continue the exhibition as soon as conditions will allow. Six hundred dollars of the funds of the show was voted to the Red Cross Society.

Moved by Mr. R. LOWRY and seconded by Mr. J. A. MARSHALL, that the report of the Horticultural Committee be accepted. Carried.

REPORT OF THE CROP COMMITTEE.

GUELPH, Canada, Aug. 5th, 1915.

The Crop Committee of the Ontario Beekeepers' Association met on Wednesday, August 4th, Three hundred members reported from all parts of Ontario showing an average of fifty-five pounds per colony. There is about an average crop and the quality is excellent. The buying power of the public is below the average, however, and it is likely that prices will range slightly lower than those recommended by the committee last year. In fact, some honey has already changed hands at prices recommended below.

Selling should be brisk at these prices as the market is clear of old honey and the high price of sugar is causing householders to turn to honey as a substitute for canned fruit; considering that it requires no preserving but can be stored in a dry place regardless of temperature without even removing it from the tin. One case was reported where berries were allowed to waste and sixty pounds of honey purchased to save the expense of picking and canning the berries.

The prices recommended by the Committee are as follows:

No. 1, Light Extracted, wholesale, 10c. to 11½c. per lb.
No. 1, Light Extracted, retail, 12½c. to 15c. per lb.
No. 1, Comb, wholesale, $2.00 to $2.75 per doz.
No. 2, Comb, wholesale, $1.50 to $2.00 per doz.

These prices are f.o.b. in 60 lb., 10 lb. and 5 lb. tins; the former being net weight with the tin thrown in, the two latter being gross weight. The difference in time and trouble of filling the small tins about equalizes the price. In selling to the wholesale merchant the lowest wholesale price should be asked; while the retail grocer should pay the highest wholesale price. The retail price to the consumer might vary according to the quantity he takes in any one purchase and whether he supplies his own package.

Signed by the Committee:

WM. COUSE, W. J. CRAIG,
H. G. SIBBALD, MORLEY PETTIT, *Sec.-Treas.*

WHITE HONEY CROP REPORT.

Ontario Beekeepers' Association, Guelph, August 1st, 1914.

County.	Reports	Number of Colonies. —Spring Count.	Pounds* White Honey.	Average Number of Pounds per Colony —Spring Count.
Algoma	3	67	3,920	58.5
Brant	9	741	55,444	74.8
Bruce	17	770	32,955	42.8
Carleton	6	190	9,885	52.0
Dufferin	4	304	16,378	53.8
Dundas	2	102	6,000	58.8
Durham	7	304	4,920	16.1
Elgin	22	891	54,340	60.9
Essex	11	144	13,478	93.5
Frontenac	3	171	5,500	32.1
Glengarry	3	413	23,075	55.8
Grenville	2	48	4,800	100.0
Huron	1	280	10,850	38.7
Kent	2	19	950	50.0
Lambton	14	495	33,780	68.3
Lanark	9	302	5,744	19.0
Leeds	12	516	7,628	14.7
Lennox	9	218	5,800	26.6
Lincoln	19	611	24,095	39.4
Middlesex	38	2,601	203,701	78.3
Nipissing	2	150	4,010	26.7
Norfolk	4	188	2,900	15.4
Northumberland	7	438	9,100	20.7
Ontario	13	435	14,604	33.5
Oxford	13	671	45,765	68.2
Parry Sound	1	14	1,500	107.0
Peel	13	641	54,848	85.5
Perth	16	817	64,166	78.5
Peterboro	5	77	2,216	28.7
Prescott	4	575	35,264	61.3
Prince Edward	7	223	7,750	34.7
Russell	7	350	18,430	52.6
Simcoe	26	1,727	77,488	44.9
Stormont	6	216	12,625	58.4
Victoria	8	361	9,930	27.4
Waterloo	10	93	4,635	49.8
Welland	18	519	25,479	49.0
Wellington	17	776	31,545	40.6
Wentworth	11	495	26,280	53.1
York	27	1,154	81,550	70.6
Totals	298	19,107	1,053,328	55.1

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* A small percentage of the honey reported is sold in comb honey sections. As a colony managed for comb honey will produce about half as much as one managed for extracted honey, the Committee has multiplied the number of pounds of comb by two before adding in with the extracted.

DARK HONEY CROP REPORT.

The Crop Report Committee of the Ontario Beekeepers' Association met on Thursday, Sept. 9th, to consider the crop of dark honey. It was found that 105 members had reported 116,400 lbs. from 5,807 colonies; being an average of 20 lbs. to the colony. This is about double of last year's average. The Committee advises members to ask 7½c. to 8½c. per lb. wholesale, depending on the size of package and the quantity sold in one order. No buckwheat honey should be retailed for less than 10c. per pound.

The local demand for white honey is exceedingly good as many people are buying honey to put away instead of canned fruit, and the prices recommended by the committee are being realized.

Wholesalers are cautious about buying all lines of goods, including honey and naturally have made an effort to buy as low as possible. A few large orders have been filled at a slightly lower figure than recommended, but these orders were for ton lots.

There is yet a large quantity of light honey unsold, but the market is firm and a great many of the smaller beekeepers report their crop all sold at prices recommended by the Committee. All considered the Committee feels that honey need not be sold below prices recommended.

Signed by the Committee:

Wm. Couse, W. J. Craig,
H. G. Sibbald, Morley Pettit, *Sec.-Treas.*

Mr. H. G. Sibbald: I believe the demand for honey in the west has been exceptionally good—better than we expected, and a great deal of honey has gone west. The money situation has improved and the war is not affecting prices as much as we thought it would. The demand for honey has been very good. The people are eating more honey than they did formerly. I would like to see the honey all cleaned up at the prices we set.

Mr. W. Couse: You forgot something. The Committee met early in August and we were all within a cent of what we thought should be asked. I have not sold any honey under 11c., and I think the majority are keeping that price.

There was a suggestion made that we attempt to ship honey to France or the Red Cross Society. We do not yet know what honey has been sent. I had an idea that if we could send honey in small tins it would be a great benefit. I have an order from France right now for honey on account of the honey that has already reached France. They sent back for more honey, and it looks to me as if there is a market open there for our honey.

Mr. F. W. Krouse: They asked us to put it up in ten or sixty pound tins, and there was no chance of putting it in small tins.

Mr. Morley Pettit: We first discussed putting it in one-pound tins. We knew they had been buying from New Zealand in that form to be used in the rations handed out to the men who were fighting in the trenches. What we were asked for was honey for use in the hospitals. This honey was to be forwarded by the Red Cross Society. We were told by people connected with that Society and also by a military man who had returned from the front, that the larger packages were most satisfactory for hospital work, because honey would be used in large quantities, and if they opened a sixty pound tin it would be all served out in a short time. I have not discovered any way of finding out how much honey has been contributed in response to that appeal. Not very much went to Toronto headquarters. But word has been coming to me from one source and another of contributions made by county associations and individuals, and that leads me to believe that quite a large quantity has been contributed.

Moved by Mr. KROUSE, seconded by Mr. HOLMES, that the report of the Crop Committee be adopted.

REPORT OF EXHIBITION REPRESENTATIVES.

CANADIAN NATIONAL.

MR. J. D. EVANS: As usual we have had some difficulty with the exhibition authorities. A year ago we had a most satisfactory arrangement. They gave us $600 and we put up a good exhibit. This year I saw the manager and his assistant, Mr. Rogers. The manager said, "You will not get $600 this year." I said to him, "If we do not get the $600 we must have the right to sell honey." It was agreed that exhibitors should be allowed to sell in tins. They did not want any glass sold because it gets broken up on the grounds. The authorities agreed with me that exhibitors would have the right to sell in quantities of half pound tins of extracted honey and five sections of cartons. It is unfortunate that nothing a committee does is final. We had about $325 for prizes. Later on the Executive proposed to charge exhibitors $100 apiece. The intending exhibitors did not let me know of this. I never knew they proposed to charge a fee until I came to the exhibition. Only one man, Mr. Lang, exhibited. The others all very properly backed out. I do not know that Mr. Lang had to pay $100. I am very sorry that the exhibitors did not let me know that they made this charge, because I would have made a strenuous objection. I think it would be a good idea if for one year all exhibitors withdrew and they did not have any honey show.

Moved by Mr. W. W. WEBSTER, seconded by L. HARKNESS, that the report be adopted. Carried.

OTTAWA EXHIBITION.

M. B. HOLMES: As your representative at the Ottawa Fair my ambition has been to get a fair percentage of the amount offered for prizes, and I have been successful; but I think there is always room for improvement. This year there was slight friction owing to the fact that a grocer made an exhibit along with the rest. I did the best I could to persuade the management that that was not a proper thing to allow, and that the prize list was intended to encourage beekeepers and should be offered to producers only. The management suggested making a special class for grocers, but I told them it would not be a good plan, and I thought the prizes should be offered to producers and producers only.

Moved by R. LOWRY and seconded by Mr. BAINARD, that the report be adopted. Carried.

WESTERN FAIR, LONDON.

MR. E. T. BAINARD, Lambeth: Our great trouble has been in getting exhibitors to take hold and make an up-to-date exhibit. This year we had a new class and we got one or two to come in. To make up the prize list we got money from the Association and also from outside, and I hope that next year we will be able to make a creditable showing.

Moved by Mr. Krouse and seconded by Mr. Webster, that the report be adopted. Carried.

Mr. W. Couse: I think we should know whether Mr. Lang had to pay the $100.

Mr. Lang: No; I did not have to pay that much.

Mr. Couse: Did you have to pay at all?

Mr. Lang: That was left to the Association.

REPORT OF THE SECRETARY FOR 1915.

Morley Pettit, O.A.C., Guelph.

The total number of memberships in the Ontario Beekeepers' Association received during the year ending October 31st, 1915, is 1,130. Four hundred and twenty-six of these memberships came in from affiliated societies, and the balance of 704 by single subscriptions. There have been no new county associations formed during the past year, but the Norfolk Association has come back into affiliation, and the Peterboro Association has dropped out, making the number of affiliated societies the same as a year ago, viz., twenty-six.

The following is a list of the affiliated societies with their members:

	Members.		Members.
Brant	13	Lincoln and Welland	39
Carleton	10	Middlesex	31
Elgin	18	Norfolk	11
Essex	15	Northumberland	9
Glengarry	10	Oxford	24
Grey	12	Prince Edward	9
Haldimand	11	Russell	18
Halton and Peel	22	Simcoe	11
Huron	18	Stormont	7
Kent	11	Victoria	22
Lambton	20	Wellington	33
Leeds	18	Toronto	16
Lennox and Addington	5	York	13

It will be seen by comparing this with last year's list that several of these societies have increased their membership, namely: Haldimand, Lambton, Leeds, Lincoln and Welland, Middlesex, Norfolk, Oxford, Russell, Wellington and Toronto. Great credit is due the secretaries of these Associations for the results they have shown in building up the membership.

The queen order business was continued during the year. Two hundred and sixty-four members purchased 1,778 queens at an average price of 70c. each.

Last year 247 members purchased 2,143 queens. That is, a larger number of members in 1915 ordered a smaller number of queens, sending in 457 individual orders as opposed to 346 orders in 1914. This meant that the secretary had 111 more orders to handle this year than last. But as an increasing number of members are being persuaded to purchase pure-bred stock, the object sought is being attained. The service will be continued in 1916.

The Treasurer's Report was also read.

Moved by R. Lowey, seconded by F. W. Krouse, that these reports be adopted. Carried.

SUMMER PROTECTION AND SWARM CONTROL.

F. W. Krouse, Guelph.

I do not take my bees out of the winter cases at all. I leave them in the winter cases with four inches of packing around them. I merely take off the top cushion so that I can put on my supers and handle the bees.

I claim that this protection around the outside of the hive keeps the bees in an even temperature. I cannot give you any of the scientific points in connection with temperature. From observation and from results I do know that bees do better in the packed case than they do where they are not packed.

In the first place the queen spreads her brood much faster in a packed hive than in an unpacked hive. You would be surprised how quick you will have brood right to the outside, whereas in an unpacked case you would have a very small brood nest. Of course where you leave your bees packed until quite late that is a different thing. I am referring more particularly to beekeepers who keep their bees in the cellar and move them out in the spring, but where they are packed and left packed until it is time to put on the super there is not so much difference. But even when they take the packing off we have days that are fine and cold days when the cluster will draw together. If the cluster draws off very much there is always some of the brood that will perish.

I can make a nucleus much earlier in the season. I make all my increase by nuclei and I can do it much earlier in the season and have no worry about the weather getting cold and the bees perishing or the brood getting chilled. I can assure you that it is quite a comfort where you have 8 or 10 or 15 nuclei, and the weather happens to turn cold and continues cold for three or four days, to feel that your bees are all right. I have made nuclei when I did not feel so comfortable. That was when I had taken them out of the packing. I have lost several nuclei in that way because there were not enough bees to keep it covered and they chilled.

You can get your combs drawn out much earlier in the season. What I mean is, if you haven't all full drawn combs and the colony needs room sometimes when you put the foundation on top of the hives and the weather is not warm enough the bees don't do anything with it. They will gnaw holes in it and destroy it. Last summer I had one yard of bees that had to go on full-sheet foundation. I put the supers on the same day and in the yard there were only thirteen colonies packed and the balance were on summer stands. This is the yard that I worked on shares, and the man who owned it always puts the bees in the cellar. They are eight-framed hives. A year ago we had no honey. The bees that were not packed were a sorry sight the first time I went out to look at them. Practically all the sheets of foundation were spoiled. There were holes in them, and most of them were gnawed away from the top bar. The ones in the cases, however, were different. Out of the thirteen that were in the cases twelve drew out their combs. There were nice straight combs and partially filled with honey. I do not know why they should gather more honey than the bees on the summer stands, but they did, and it was proof to me that it was better to have the bees packed. I never had it so clearly demonstrated before as in that particular case. I do claim that you can get more honey from bees that are left packed through the summer than you can where they are unpacked. I have tried it out in different yards, and the bees in packed cases have always come out the best. It is quite an item to find from 20 to 50 lbs. more honey per colony in favor of the packed hives, and that is sufficient proof to me that that is the best way to keep bees in the summer time.

You get brood-rearing much later in the fall. The queen keeps on quite late, and the hive will go into winter quarters with lots of young bees. I claim that one of the main points in wintering bees well is to have plenty of young bees and lots of stores. This year when the buckwheat flow stopped my brood-nests were full of brood from side to side and I think that is very important. I do not know whether you would get this condition where you have not buckwheat because the queen would not lay if there was no honey coming in.

Swarm Control.

If you have an even temperature you will not have so many swarms. I claim that when the temperature goes up and down a great deal you will have more swarming, but where you leave the hives in their winter packing the temperature is more even. We all know that in icehouses and cold storage plants the packing is kept all year around so as to keep out the heat and the cold, and it is the same way in leaving the packing on the bees, to keep the temperature even, and the bees do not seem to be so inclined to swarm. There ar three reasons why I think my bees do not swarm so much as others: One is the summer protection, and the other is the deep hive that I use in my outyard. It is twelve inches deep, and a ten-framed hive the same as the Langstroth colony, only deeper. The third reason is the young queens. Where you have young queens and packing and deep hives you will not be bothered very much with swarming.

I do not know what I can say about swarm control, as I have not had very much trouble with it. All I do to prevent swarming is where I find the queen using the whole brood-nest or is crowded I lift up one or two combs and put them on top, or put them in a colony that is not so strong. By doing that you strengthen the weaker ones and keep your yard even and have all your colonies in shape for making honey. By putting in one or two empty combs in the place of the combs you take out you leave the queen room to lay and as long as the queen has room to lay there will be little trouble about swarming. I do not do anything more than that to keep down swarming, and I do not go through all my colonies, I could not. I go to the yard once a week and pass through it and note the colonies that I think want attention, and I attend to these and the others are left.

Mr. Weir: What amount of packing do you require around the hives.

Mr. Krouse: I use four inches of packing. I have tried different things, sawdust, planer shavings, cork granules, and I find that cork granules are by far the best. I also tried forest leaves. I understand that in the tests made a few years ago that a dead air space was found to be better than packing.

Mr. J. F. Dunn: Sawdust is considered one of the poorest of insulators, about 50 per cent. Planer shavings about 65 or 68 per cent. Some people do not consider forest leaves as good as planer shavings, but I understand they are rated a little better. One reason why planer shavings is better than sawdust is because it makes one dead air space, if there is such a thing. Next comes asbestos and tar felt that they use for wrapping around water pipes to keep them from freezing. That is something like 80 per cent. A mistake that some beekeepers make is they buy the cork at the grocery stores about Christmas when the grapes are all sold. That is away ahead of any other packing, but re-granulated cork is just like dust and is much better. It is $34 a ton. If you want to pack five or six hives send 40c. for 23 lb. sack. It will cost the same express as a larger quantity. I line my hives with asbestos. One inch of cork dust is just as good as four or five inches of planer shavings.

Mr. Krouse: Cork is far the best. There is nothing at all equal to it.

Dr. E. F. Phillips: I have just been making some tests, and I am afraid some erroneous conclusions might be drawn from some of the statements that have been made. I went to the Bureau of Standard, which is our Physical Department, and they told me that many of the tables that had been issued regarding insulation, value of material, etc., were entirely erroneous. They gave me some of their tests. They had twenty different insulation materials, and there was not twenty-five per cent. difference between the best one and the poorest one of the lot. We made tests of one of the highest testing insulating materials as compared with ordinary sawdust, and there was not twenty-five per cent. difference between the two. One and one-half inches of the best material we could get and was not as good as two inches of sawdust on actual test. I give you that for what it is worth.

Mr. J. H. Burkholder: Do you advocate the use of a double-walled hive?

Mr. Krouse: Yes, that is what I use.

Mr. Burkholder: Do you advocate leaving that packing case on all summer?

Mr. Krouse: Yes I leave it with four inches of packing all the time.

Mr. Burkholder: Are there any ants in the part of the country you live in? If there were you would have more ants than bees in the summer. I have considerable trouble with ants. They will get on top of the quilt.

Mr. Krouse: Don't you have that same trouble with your unpacked hives?

Mr. Burkholder: Rarely ever.

Mr. W. W. Webster: I pack my bees the way Mr. Krouse suggests and last summer I had trouble with the ants. They closed up one entrance completely. I took some coal oil and made a little hollow at the entrance and poured that down. After two applications there was no further trouble with the ants.

Q.—When you leave your hives packed all summer how do you manage to keep them dry?

Mr. Krouse: The roof is built so as to telescope over your case and there is one and one-half inches down on the side, and when that is hung on top of your super there is only about eight inches to the weather, when two supers are on there is scarcely any water that will get into the packing. Certainly not enough to do any harm. I have had them piled up with five supers and still my packing was all right. Even with a few days rain everything has been dry inside.

Q.—Is the case around the super of any value to you?

A.—Yes it is of value until you put your second super on.

Mr. Lowey, Woodrows: Speaking of ants, I have had them by the million. I brush them off. I think they get on the boards for the warmth. Of course when you open the hives a great many will work in and annoy the bees.

Rev. Mr. Lewis: I have been in Africa and in India where they have the soldier ants. These ants march four abreast, and if they once get into the house you have to look out. In Africa and India they can absolutely keep the ants out by using ashes. Would it not be possible to set the hives on ashes and that would prevent the ants from getting near them. All you need to do is to sprinkle the ashes on your door-step in Africa or India and that will absolutely prevent the ants from coming in.

Mr. Lowey: Moth balls will keep ants away.

Q.—Do you group your hives together or have an individual case for each hive?

Mr. Krouse: I have an individual case for each hive.

Mr. Chrysler: It may be asked why the packed case is better than the unpacked one, and why it will decrease swarming to a certain extent? In all parts of the Province of Ontario we have changeable weather. Very cold nights and warm days, and that is one reason why I think the hives should be protected in summer time. If the bees get started in the supers and the honey is coming in good, and you get a few cold nights, the bees will go down and re-cluster in the brood-chamber. The cause of swarming is the improper employment of the bees. They may be up in the supers but they will be driven down by cold weather and also by the hot sun in the daytime. If you put a comb on top of the cover the sun will melt it and remember that the combs just under the cover are not protected from the heat and on a chilly night they are not protected from the cold, and when it gets very hot or cold the bees are driven down and that constantly causes swarming. Where I had large covers I have made an average of 150 lbs. per colony in an outyard. I think it is very important to have protection against hot days and cold nights in the summer time.

Mr. Morley Pettit: What Mr. Chrysler has just said corresponds with the experience of a very successful beekeeper with whom I was associated in my early days in producing comb honey. He had on the comb honey super a cushion of chaff about three or four inches thick. On top of that cushion of chaff was a telescope cover which projected out far enough to shade the super. He had the insulation on top and the shade for the sides. These covers were heavy and not convenient to handle, but they certainly had the great advantage of insulation which was valuable in comb honey production?

Mr. Weir: What would be the weight of your hives, packing case and brood chamber included?

Mr. Krouse: All the bees I have shipped I have left them packed just the way they stood in my yard, and they go at 110 lbs. in the spring, when there is quite a bit of honey in them. One man could not lift them very well, but two men could pick one up quite easily. If I am in the yard when they swarm I get my helper and put the swarm back in again.

Mr. Chrysler: Why do you want to lug them around?

Mr. Krouse: They are all right as long as you don't have to move them. I have a yard of bees to move. The farm where I keep them has been sold, and the man who bought it wants to build a barn right where my bees are. In that case the packed hives are not quite as handy to move as the unpacked hives.

Q.—Do you use a double or single floor?

Mr. Krouse: I started out to pack the stand the same as the sides, but I found there was no difference in the results and I do not pack them now. I just use the single floor. The bottom is apt to draw up moisture in the fall and the packing gets wet and soon rots.

Mr. Weir: Do you always give four inches of insulation?

Mr. Krouse: I would not want to make it any less. If I made any change I would make it more. I do not see why one should try to lessen it when we know they do so well with four inches.

Q.—When you are feeding your bees for winter how do you ascertain what they have?

Mr. Krouse: In all the packing except the cork I can handle them just the same as if they were on a summer stand, but if you have cork packing you cannot lift them because it runs so quickly. Mice cannot live in cork packing. It is too fine. If you use chaff the mice will work in.

Q.—Do you just guess at the condition the bees are in or if they want more feed?

Mr. Krouse: Where they are packed in cork I look through them from the top. In taking out the last honey I mark my colonies for winter stores. If I think they are short I mark on the outside what I think they want, and I use judgment as to the kind of weather we have in the meantime, so as to know whether they are likely to carry in any more stores. If I mark a colony for 50 lbs. I always feed it 5 lbs. more. I figure it is good business to put in the extra five pounds.

Q.—Do you keep in ten frames or nine?

A.—Ten all the time.

Q.—Do you have them all filled with stores?

A.—No, they won't be nearly full.

Q.—Why do you change your mind so quickly and add the extra 5 lbs. of feed?

A.—Just to be sure to have plenty.

Q.—What becomes of that 5 or 10 lbs. in the spring if the bees don't eat it?

A.—If you have any honey in the hives it will be around the outside and the syrup will be stored in the middle and it will be gone. I never yet saw any syrup in any of my colonies.

Q.—Do the bees always start to eat the stores from the centre of the hive?

A.—No, but they will cluster where you put in the last feed.

Mr. G. A. Deadman, Brussels: I hope you won't get the idea that 20 lbs. extra to the hive is because you pack them. I know a man in Owen Sound who had packed hives, and he gave up the business because it made too much work in the summer time. I get more honey from unpacked hives than I do from the packed ones. You get your buckwheat honey from the unpacked hives just the same. The packed hives are too heavy to handle. It is all very well if you have but a few hives, but where you have 300 colonies then you don't want the packed hives. We use a double-walled hive with only a 2-inch air space.

Mr. Krouse: The packed hive is not so heavy as some people seem to think. With the bees and all it only weighs 110 lbs. It is built a half-inch longer and the lid does not weigh more than 8 lbs. I use that lid to set my supers on. It answers that purpose very well, and I find that I can lean up against these hives when I am working, and it is just like sitting in a chair.

Mr. J. L. Byer: I know that a great deal could be said on both sides of this question. I believe that if more packed hives were used there would be less swarming. Our bees in York county are mostly kept in packed hives. I have one yard where I use single-walled hives, and we have more swarming there than in any other yard. This yard is near Orillia, and I think it is on account of the cool nights. The bees in that yard will swarm and swarm. I am convinced that if packed hives were used in the more northerly counties there would be less swarming. If I were going to start this yard over again I would use the packed hives. On the question of work, I would call Mr. Deadman's attention to the fact that his hives have to be packed every fall, and where they are left all summer it saves all that trouble.

Mr. Krouse: I can take my car in the fall and pack my whole eight yards in one day. If I did not leave them packed during the summer time I could not do that. I start out in the morning and go from one yard to the other, and put on my cushions and I am home again at night. I have nearly 500 hives.

QUESTION DRAWER.

(Conducted by JNO. A. MCKINNON, St. Eugene.)

Q.—If you were going to start an outyard of 100 colonies how close would you go to a neighbor who had about the same number of bees, and still expect him to be your neighbor? There being no excessive honey-flow at any time.

A.—If I were starting an outyard I would not want to have that number of colonies any closer than three miles. I think five miles would be better. If I were starting out a yard where there were any bees at all I would not start them closer than three or five miles. There might be some difference in some locations. I think 100 colonies is sufficient in any one location.

Q.—Do you advise the use of queen-cell protectors?

A.—I used to use queen-cell protectors, but this year I have not used any and I think I get on better without them.

Q.—How did you overcome that?

A.—I had a surplus of queen-cells all the time. I used to distribute the queen-cells on the tenth day, but this year I did not do it until the eleventh day and then they were just ready to emerge from the cells. When the queen is fully matured they won't destroy that baby queen, but they will destroy her if she is in the pupa stage.

Q.—How do you place your cells in your hives

A.—I just take out a little of the comb with my finger and press the cell into the side of the comb, and the bees will catch it in there.

Q.—Can you get cement-coated nails in Canada?

A.—Yes.

MR. DUNN: Take common nails and a couple of pounds of shellac in a tin dish, put the nails in a dish and shake them up. You will have the cement-coated nails without paying the extra price.

MR. KROUSE: I do not pay any more for the cement-coated nails than I do for the ordinary ones.

Q.—What is the best way to unite?

A.—There are different ways to unite. I generally have about 400 or 450 nuclei to unite every fall. I just bring them together and unite them—that is all there is to it. I do it on a cold morning when the bees are clustered together. I lift the frames from one hive and put them in another. I do not mind if there are a few bees killed. If one had two very valuable colonies, possibly it would be better to use a sheet of newspaper between them.

Q.—When do you unite?

A.—I begin in September and finish about the 15th of October.

Q.—What do you do with the queens?

A.—I dispose of them. I sell queens.

Q.—Do you smoke them?

A.—No; I do not use anything. I just put them together. Bees that have been queenless for a week haven't much fight in them, and they will unite with any other colony. Take a colony that has a virgin queen, and a colony that has a laying queen, and try to put them together and you will only have one out of the two. They will fight it out until there is only one colony left.

Q.—Do you always put the queenless nucleus with the nucleus that has a queen, or do you unite the queenless nuclei and then give them a queen?

A.—I nearly always put them into a new hive, and I think that has something to do with it. They are less apt to fight when they are put into a new hive and in a new location.

Q.—Is it advisable to change heavy pollen combs for new foundation?

A.—If the pollen was hard in the comb I think it would be.

Q.—Does a queen raised in August or September prevent swarming the following season?

A.—According to my experience she does not. They are just as apt to swarm the next season as not.

Q.—Would a queen raised in an earlier month prevent swarming?

A.—No, there is more in the strain than in the queen. If you have a strain of bees that won't swarm, all right, otherwise they will swarm. It is in the blood.

Q.—What is the best way to get rid of surplus honey in the brood-chamber at the beginning of the white honey-flow?

A.—I really do not know the best way. I generally put supers on the colonies during fruit bloom, and I use half depth supers and what surplus honey goes in there I use in making nuclei later or for raising queens. I get rid of my early honey in that way.

Q.—In brief, please inform a beginner how to make nuclei.

A.—In order to make nuclei the brood should all be sealed over. Nine days before you expect to make your division place your brood combs over the excluder and use Italian bees. They will stay better whenever they are put. You can make your nuclei in the morning. Give a laying queen or a virgin queen. It might be best to plug the entrance to the hive for 24 hours. They are more apt to stay.

Q.—You speak about giving this nucleus, after making it up, a virgin queen. If you have a virgin queen three or four days old, how do you introduce her?

A.—I close the entrance and leave it closed. Just as soon as the bees find that they cannot get out they get demoralized and will gorge themselves with honey and go around in there as if they were crazy. Then, you run in any kind of a queen and she won't be hurt. All you have to do is to take the grass out of the entrance and run the queen in; then leave it closed for a while and everything will be all right. Virgin queens are rather hard to introduce; in fact, it does not pay me to bother with them. I would rather use queen-cells. You do not have to use smoke, because the nuclei are just formed and they are demoralized.

Q.—When do you start to make them, and what protection do you give?

A.—I start about the first of June, and they do not require much protection. I use a two and three-division hive, making two and three apartments.

Q.—What is the best protection from wind in the apiary?

A.—I think natural protection is the best when you can get it.

Mr. Dunn: There has been quite a bit said about high board fences and taking a board out for ventilation. Around my yard I have a lattice fence 8 feet high. I have gone out there when the wind has been blowing 22 miles an hour, and although the wind was blowing around the yard you could not tell which way it was blowing. It was just a nice breeze.

Q.—How can you get swarms and honey from the same hive?

A.—In a good honey season you can get swarms and honey from the same hive, but you will get more honey if you do not allow them to swarm. Even in a good year you can get good honey by not allowing them to swarm and make your increase later on, but of course you will have to feed. I did not make any increase before the first of August. I had more than I knew what to do with, and I divided my colonies in two and I had to feed sugar syrup.

Q.—Will laying worker eggs hatch and raise drones?

A.—Yes, laying worker eggs will develop into drones, but a lot of larvæ die in the larvæ stage. I have seen a lot of that larvæ that look like European foul brood, in fact it looks so much like it that you could not tell the difference.

Q.—Is a beekeeper subject to a business tax or ordinary taxes?

A.—I do not think so, not in our county.

Q.—What is the best way to introduce a queen?

A.—I just ran the queen in on the comb and put the comb back in the hive in 15 minutes. If a colony swarmed I hived the swarm, and then go to the old brood-chamber and cut out the cells and introduce a laying queen, and inside of 15 minutes I would have a laying queen in the parent colony. Then I would hive the swarm alongside the parent colony and leave it there till evening. Then I would go out and pinch the head off the old queen in the swarm and leave them there all night. The next morning I would place the swarm on top of the parent colony.

Q.—That would be the present year's queen you introduced

A.—Yes. I tried to introduce two or three by the smoke method and I lost them all.

Q.—You have the advantage of taking your queens right from the hives. They had been laying a minute or two before.

A.—Yes, but that did not make any difference. I sent down to Mr. L. H. Robey of West Virginia and got six queens, and inside of a half hour after I had these queens out of the post office they were on the combs, and I did not lose one.

Q.—How would Dr. Phillips deal with a case of European Foul Brood if he were inspector?

Dr. Phillips: I could answer that question very easily if I had a case in my own yard. From the standpoint of an Inspector it is necessary to size up the beekeeper more thoroughly than the disease. In the case of a thorough-going beekeeper who has discovered the disease in the earlier stage I see no objection to the use of the re-queening method. I have seen it used, and I have used it myself. I feel rather sorry for the inspector who has to decide some of these problems. If he goes into the yard of a beekeeper who is not well informed and whose judgment he cannot trust, it is his duty to recommend more stringent action and not even intimate to the beekeeper that there is an easy way, because there is too much danger in the de-queening method. I can tell you what I did recommend in the case of an amateur beekeeper. I found 17 colonies, two of which were queenless. Fifteen had European Foul Brood in advanced stages. I am satisfied the other two would have had European Foul Brood if they had queens. The first intimation was to get Italian queens. I do not see any use in trying to treat European Foul Brood in any other way. I recommended ten Italian queens and the shaking of the bees from ten colonies on to drawn combs absolutely dry and the Italian queen was introduced at that time. Then, waiting a week or so until the brood emerged from the combs that have been taken away and piled up on the remaining five. Then treat three or four of these hives in the same way. Dry combs without honey, without pollen and without any brood, and introduce an Italian queen. By that method this amateur beekeeper who had no experience whatever succeeded in eradicating disease. These combs were absolutely new. I felt perfectly justified in making that recommendation to this amateur, who was bright enough to do as I told him. He happened to be a relative of mine. As probably a good many of you know, in the bulletins issued from the Department we do not recommend too strongly the simpler methods, because these bulletins go to people that we know nothing about. Some of them are absolutely the worst kind of beekeepers, and if we were to recommend nothing but the de-queening method it would end disastrously in over 50 per cent. of the cases. When the Inspector goes to the apiary he has a chance to size up his man. That is the reason why in our bulletins we give the de-queening method and say this treatment is recommended only to the expert beekeeper.

Q.—Is it advisable to use good comb that is filled with pollen in the brood nest?

A.—Yes, I would say it is.

Q.—How would a house apiary compare with a packed hive for summer use to control swarming?

A.—I haven't any use for them. I think they are pretty much out of date.

Q.—How do you prevent robbing after extracting?

A.—I try to prevent it getting started. If it gets started the best way is to plug the entrance and leave what robbers are in the hive until everything gets quiet. If the robbing starts in the morning, and is getting bad, move the colonies that are doing the robbing fifteen or twenty feet to one side and put empty hives in their place. Inside of twenty minutes all the robbers will be buzzing around the empty hives. Then I plug up the robbing colony and put them back on their stand and cover them up for the day. Then I am out bright and early the next morning to see that they do not get started on me.

Mr. Krouse: This year I had one colony that were inveterate robbers. One morning I came out and they were robbing pretty lively. I had no trouble in locating where the robbers came from, and I changed the two hives. I took the hive they were robbing and put it where the robbers came from, and I never had anything work so nicely. They went on robbing for a while but they soon settled down.

A Member: About seven years ago I tried that, and they still carried the honey from one hive to the other.

Mr. McKinnon: There is a time when the robbers are so determined that they will rob from their own hives. The best plan is to remove one of the colonies out from the bee-yard.

Q.—Do you think it profitable to shake as late as October first for American Foul Brood? When is it necessary to feed syrup?

A.—If the beekeeper has lots of full-sealed combs of honey I do not know but what it would be profitable to shake as late as October 1st.

Mr. Pettit: When you would have to feed them to get them to build comb it is very likely not profitable to do that, because where you compel bees by feeding to build comb late in the season you draw on their vitality to such an extent that you jeopardize their chances of wintering. Then their chances of gathering pollen after that are practically gone, so that they haven't the pollen they will need for early brood-rearing. In addition to that you have the risk of their contracting the disease again, because by leaving the bees there you always run that risk in treating for American Foul Brood. You go to the expense of feeding these bees up and you run the risk of their not wintering after all. I would say positively where you find colonies diseased with American Foul Brood too late in the season for them to build combs brimstone the bees.

Wm. Elliott: Last season after the honey season was all over I found some 41 or 42 colonies of bees in my yard, with only one or two, or perhaps a dozen cells. I could not stand the idea of putting these into the winter and knowing the disease was there. I wanted to know that I had no disease, and, acting on the advice of a friend, I delayed shaking until the 25th of September. I had something about 40 good strong colonies. I placed the can of 5 lb. of sugar syrup so that they would start to draw out starters, and in four days I reshook onto the full sheets of foundation, again placing in a 5 lb. can of sugar syrup. I kept supplying right along, and at the present time out of that number of bees I have only 16 colonies. I think it would have been better to have destroyed the comb and bought bees next spring. I have only now 16 colonies and they have cost me $4 a piece and that is all I have out of 42 colonies. They simply disappeared. I cannot tell where they have gone. The season of the year being cold they lost vitality fast.

Mr. Krouse: I have had some experience in shaking bees for American Foul Brood. I shook in October on solid combs of honey, and I put one empty comb on the side, and what honey they had with them they stored in that comb. In one or two days I took out that comb without using smoke or anything. I jerked the bees off it quick and put in another full comb of honey and I had only one that contracted the disease again, and they always came out in good condition.

Mr. Pettit: In the hands of a careful beekeeper that method might be all right, but it is a risky method to recommend to the general beekeeper.

Q.—Is it better to feed syrup than honey?

Mr. McKinnon: In some cases I think it would be if the syrup was properly made.

Q.—Will bees destroy a virgin queen if brood or eggs are added before the young queen commences to lay?

A.—I do not think so.

Q.—How do you trap a skunk? When do you start queen-cells for home use?

A.—I have trapped skunks in my yard. I generally leave a heavy cover against the hive so as to make a runway for him to pass through and I set a trap in the runway. They are easily trapped. They will walk over a trap in broad daylight. I usually start queen-rearing in May during fruit bloom.

Q.—Is it in the interest of beekeepers to make more and more beekeepers? Give reasons.

A.—There might be such a thing as having too many beekeepers. There are a number who start in the business who do not stay with it. It is only people who like bees who will stay in the business.

Q.—How should foundations be arranged with other combs to get good new combs?

A.—I usually put it on during the fruit bloom and allow the bees to draw it out then. Put it on strong colonies. I would not mix them. If you put foundations between two drawn combs they will draw out the cells of the combs and they won't draw out the foundation.

Q.—Why do you think they draw it out better in the super?

A.—They do not leave that space between the bottom bar and the bottom edge of the comb. They will draw it right down to the bottom bar in a good honey flow.

Q.—Can comb honey be liquefied without destroying the comb?

A.—I do not know of any process that would liquefy comb-honey. I do not think heat would do it.

Q.—What are the principal outside indications of swarm fever?

A.—They will hang out in front of the box. It is pretty hard to tell whether a colony is inclined to swarm or not without looking through the colony. You have to look to the brood-chamber to be sure.

Q.—What is the best hive cover?

A.—That is a matter of opinion. Different covers will suit different beekeepers. I like a hive cover with a space between the cover and the frame so that you can put some packing there in the spring.

Mr. Evans: The hive cover I use is simply made of boards at each end between the two boards there is nailed 1½ in. strip. This cover is heavy enough so that it won't blow off. There is always an air space of 1½ in. to keep the sun from beating down on the top of the hive. Use 3 in. nails to nail the boards together. I haven't any difficulty in getting boards 18 in. wide. It costs me 40c. for the material. I do not like to see covers with stones on top to keep them from blowing off.

Q.—What is the best way to get pollen out of the extracting combs?

A.—I do not know any way of getting the pollen out except using the combs in the brood nests. If they are piled in a shed sometimes they get mouldy. I use these pollen combs as extra brood chambers for breeding and get rid of them in that way.

Q.—Will they use that pollen after it gets dry?

A.—Yes, but not if it is mouldy.

Q.—Would you cut the pollen comb out?

A.—That is not a good plan because you get too much drone comb.

Q.—Raising queens and re-queening?

A.—That is a pretty broad subject, and we have already touched on Queens and re-queening. If the bees are trying to supersede they will accept the virgin queen, and the virgin queen will destroy the old queen. If they are satisfied with their old queen the virgin will be destroyed.

Q.—Would you destroy an old queen in the fall if it had done well all summer?

A.—No, I would not destroy a good queen because she was a year or two years old. I would want to keep an extra queen as a drone mother. As a rule, I re-queen about one half of my yard every year. Two days after the old queen has been removed they will accept the new queen.

Q.—If you were re-queening would you get drones earlier by having a two-year-old queen in the hive?

A.—Yes, I think you would. If you get drones earlier in the hives with a two-year-old queen, is not that an indication that you will have earlier swarming?

A.—Not if they are handled right later on. It is no indication of swarming.

Q.—When is it easiest to find black queens? A.—I re-queened 25 colonies this fall in October, and I had no trouble in finding 10 queens in an hour in strong colonies. I would take out two outside combs, and I nearly always found the queen on the third centre comb. I did not look at any other comb. I got the outside combs out of the way and then I looked at the third comb, and if I did not find the queen there I looked at the next one. The queen is easily found when the bees are chilly. If you give them three strong puffs of smoke in October when the nights are cold that is the easiest time to find black queens. If you are compelled to do it in the summer time get up at five in the morning. That is the best time.

Q.—Why cannot the cork-packed hives be lifted the same as those packed with other materials to ascertain the quantity of food the colony needs?

A.—Because the cork runs down under the box.

Q.—An effort is being made at Washington to improve the quality of buckwheat honey. Would it not be beneficial to us to have the chemical departments of our experimental farms take up this work?

A.—I think it would if we could get a better price for our buckwheat honey.

Mr. Chrysler: All honey is known by its flavor, and it would be simply a fraud to change the color.

Q.—How can you tell the difference between European and American Foul Brood?

A.—I have had experience with both, and I would advise the gentleman who asked the question to get Bulletin 213 from the Ontario Department of Agriculture. That covers the whole ground of these two diseases.

POISON SPRAYS AND POISON BAITS IN THEIR RELATION TO BEES.

L. Caesar, Provincial Entomologist, O.A.C., Guelph.

Spraying With Poison During Bloom.

On this important subject of the danger of killing bees by the use of poison sprays or poison baits, I shall first discuss what in my belief is the most important point of all, namely: the spraying of fruit trees with a poisonous mixture when they are in full bloom. Prof. F. M. Webster, formerly of Ohio, has shown clearly that such spraying is ruinous to the bees*. I believe almost every entomologist and every beekeeper agrees with him. Unfortunately my time is so taken up with investigation work at that season of the year that I have seldom been able to travel around and see for myself how much, if any, spraying was being done during the blooming period. My experience this year, however, shows that there is more of it than I had expected. In the Niagara district I happened to visit a certain locality to see when the bloom would be off, so that I might be ready at the proper time to spray for the codling moth and apple scab, and to my surprise I found two men spraying apples and pears though the latter were in full bloom. I notified them to stop, which they promptly did with apologies. They were inexperienced growers and not deliberate sinners. I suspect, however, that there are a few experienced growers who spray just when it suits them though the law clearly states that no poisonous spray must be applied to trees when in bloom under a penalty not exceeding $25. Beekeepers will, of course, have to lay their own complaints where there is infraction of such law. It will be well for them to visit the orchard in question, take a witness along, make notes on the amount of bloom, see the spraying done and discover, if possible, the mixture used so that there may be no loophole of escape. So much for compulsion.

As to the matter of whether there is anything to gain from spraying during bloom, I may simply say that if they spray then it usually means that they will have to re-spray to accomplish the end in view, namely, obtaining clean fruit. This is because at such a time there will be many late blossoms not open and so these will not be sprayed; moreover, the presence of the blossom makes it very difficult to cover the part just beneath it which develops into the fruit and which must be covered with the mixture to keep off fungus diseases like apple scab. Hence it is not merely for the sake of the bees, but also for the sake of economy and the obtaining of the cleanest fruit that I, along with all other entomologists, in the Spray Calendar recommend that fruit trees be sprayed just before bloom and again immediately after bloom or when almost all the bloom is off. We have observed that if we wait until all is off the early blossoming trees and is nearly off the later the bees will have by this time deserted the orchard for other flowers. It is my belief that nearly all the poisoning of bees is done by the breaking of this law against spraying during bloom. Every fruit grower, therefore, should as a matter of justice to beekeepers, and in the long run to himself, because insects are essential to the proper setting of fruit, voluntarily refrain from spraying when the trees are in bloom.

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*Bulletin 68, Ohio Agricultural Experimental Station.

SWEETENED ARSENICAL SPRAYS.

Let us now pass on to the use of arsenical sprays containing molasses to sweeten them. Very little has yet been done by farmers or fruit growers with such sprays, but we have at least three pests that in some localities are very destructive, and that cannot be controlled satisfactorily in any other way than by a sweetened poison spray. These pests are the two species of cherry fruit-flies that often cause over seventy-five per cent. of the later cherries like Montmorency to be maggoty, and the apple maggot that in a few places ruins most of the apples. The time of application of the sweetened sprays for these pests is not until some time after bloom is over. For the cherry fruit-flies the first application is given when Early Richmond cherries are just showing the slightest sign of a red blush, and the second about two weeks later. Cherries nearly ripe are not sprayed. Only two applications are given. For the apple maggot three applications are given if the season is wet, and two if it is dry. The date of the first of these varies with the locality but is in July, and the second usually early in August. No spray is put on apples nearly ripe. It will be observed that at these dates the orchards under ordinary conditions would be deserted by the bees. However, someone will say that the bees would be attracted to the sprayed trees and get poisoned. I have watched this point for three years and in seven orchards sprayed by myself and assistants. I have also asked them to observe and we have not yet seen a bee feeding on a cherry, apple or any other tree sprayed with such a mixture. Further, at Mountain, on the farm of Mr. J. P. Smith, I mixed up the mixture day after day for over twenty acres of apples. His bee hives were within about 100 feet of where the mixing was done, yet no bees came to the molasses or paid any attention to it though many flies were attracted and became a nuisance. In addition there is the fact that such sprays have been used in Italy, France and South Africa for many years for the olive fly, and there have been no complaints of injury to the bees, so far as I know, where the ordinary cheap molasses was used, though where honey was added to the mixture, and in some cases where sugar was used instead of molasses, bees have been attracted. Only three weeks ago Prof. Lounsberry, of South Africa, told me that the sweetened poison pray was just as common in South Africa among growers as the codling moth spray in North America; so they evidently do not fear injury to the bees there. I confess that at first I believed that such sprays could not be used because of the danger to the bees; hence it was a great relief to me to find that the bees were not attracted by them. I mean of course where molasses was used, and we do not recommend any sweetening but the cheapest of molasses.

SWEETENED POISON BAITS.

Let us now pass to the sweetened poison baits. These, especially the so-called Kansas remedy for grasshoppers, are coming into great favor. They are remarkably efficient against cutworms and army worms as well as against grasshoppers. A modified form of them or else a sweetened poison spray may soon prove to be the best remedy against cabbage and onion maggots.

The Kansas remedy is composed of 20 lbs. bran, ½ lb. Paris green, 2 or 3 ground up lemons or oranges, ½ gal. molasses and 2 or 3 gals. water. For grasshoppers the mixture is scattered so thinly over the ground that 4 lbs. are sufficient for an acre. For grasshoppers it is put on between 5 and 7 a.m. and for cutworms and army worms after sunset. These are times of the day when bees are not likely to find it and it will be dry in both cases, and so have lost most of its attractiveness before they would normally have begun feeding. However, here again we have plenty of good evidence that the bees are not enticed to feed on it. I have myself made this mixture up and applied it on a considerable scale, and have no proof that bees are attracted to it. Furthermore, I had an assistant at Guelph place molasses and bran around the College apiary at a distance of about twenty feet. Only two bees in the course of about an hour alighted near it and these apparently did so for some other reason than the mixture, because they almost at once flew away again. The mixture was then held in a vessel near the hive until the bees, possibly to emphasize the fact that it had no special attraction for them, stung the assistant and caused his withdrawal.

I wished, however, to be still more sure of my ground, and so wrote to Kansas to Profs. Dean and Hunter who were the chief advocates of this remedy, and asked them if the bee men of that State had made any complaints. They said that they had not done so, and that they themselves had no evidence of danger to the bees though many tons of the mixture had been used. Prof. Hunter stated that now that I had called his attention to the matter he would investigate carefully. He did so the next year and the following extract from his paper shows the result:

"Two years ago, during the extensive use of the poison bran mash against the native grasshoppers, the question was frequently asked as to what effect the poison would have on bees, when distributed through a large alfalfa field where bees from large apiaries were at work. Last summer, Prof. Caesar, of Guelph, Ont., wrote me that similar inquiries came to him from apiarists. Under date of July 24, Prof. Caesar writes:

"'The beekeepers of Ontario are alarmed at the supposed danger to the bees which they believe attends the use of your remedy for grasshoppers. I used this remedy this year and saw no bees feeding on it. I should, however, be very pleased if you would kindly let me hear, as soon as possible, whether bees have been poisoned by it to any extent in Kansas.

"'Yours sincerely,
"'(Signed) L. CAESAR.'

"In order to satisfy ourselves even more fully on this subject, Mr. George H. Vansell, our Apiary Inspector, undertook a series of experiments to determine whether the bees would feed at all on the poison bran mash; and, if so, under what conditions, and with what results.

"First, to determine whether the bees would partake of the poison at all, small piles were placed on the running board of the hives. Here, the bees did not go out of their way to come to the piles, but those which ran against it, stopped and began to lap up the mixture quite greedily, sometimes starting off, to return to lap again. Such were retained, and all died within three hours.

"A number of the bees were confined in a bell-jar with this poison. After a time, the bees came down and sipped the mash contentedly; they would then fly to the top of the jar, to return again for more of the mixture. All those confined in the bell-jar partook of the mash and died; but on the running board of the hive only 15 of those that passed over it during an hour's observation stopped to taste it. When the bran mash was scattered about a few feet from the hive, not a single bee halted to taste the substance.

"Second, the bran mash was distributed in a sweet-clover patch where bees were unusually abundant, and not one was observed feeding or in any way being drawn toward the mixture. It was also distributed freely among rotting peaches on the ground where bees were feeding in large numbers, with similar results.

"Last year, the poison was placed around in small piles among apiaries of 38 stands of bees and the honey systematically taken from the stands. This usually makes bees more active in feeding. Even under these conditions but a single bee was observed feeding on the mash. These attempts at feeding the poison bran mash to the bees were repeated morning, noon and night, and no evidences were observed which would tend to show that there was any appreciable danger to the bees from the distribution of this poison.

"Furthermore, against the insects for which this poison is used, it is most effective when scattered early in the morning or late in the evening. Before the working hours of the bees began the poison would, then, be too dry for them to feed upon.

"From this it would appear that when the poison mash confronts the bees, they will partake of it and perish; but that the use of the mash in field work is not attended by danger to bees."

I think that this is as near conclusive proof as can be obtained that you need not worry over these sweetened poison baits.

This is, I believe, all the information of any importance that I can give you on this disquieting subject of the use of poison baits and sprays. I feel satisfied that any further observations or experiments conducted will bear out the correctness of the statements here made. I should be glad to see your Association conduct careful experiments and prove the facts to your full satisfaction.

Mr. J. L. Byer: One principle has been overlooked by Prof. Caesar in the matter of spraying fruit trees. He said the spraying done at Mountain was in July. At that time it is altogether probable that a strong flow of nectar was on. We all know that when the honey flow is on you cannot put anything out that will attract the bees. You can put these baits in our alsike fields and the bees will not look at them. That same argument would apply to the alfalfa fields in Kansas. We all know that during a dearth of honey flow the bees will hustle around, but when there is a strong honey flow it seems to be natural for the bees to go to the flower, and you cannot induce them to look at anything else. You can almost put this stuff over the hives and they would not look at it, but they will touch these poisonous sprays when there is absolutely nothing else in the fields for them to get. Two years ago in our own locality a bait was put out for grasshoppers during a dearth of honey and the bees did go to the poisoned bait. That is the only way to try out this experiment. You must try it when there is an absolute dearth of nectar. Do not think I am trying to controvert what has been just said. I am trying to put you right on a position that I believe has been overlooked.

Prof. Caesar: Fortunately, I did have that point in view. I was satisfied at the time we were spraying the cherry that it was a time when there was abundance of bloom from wildflowers and other plants, and I knew the bees had plenty to feed upon. But at the time of spraying cherries that is always the condition of the country, flowers are in bloom. The same thing applies when we spray for the apple maggot.

Q.—Sometimes that is the very worst time for the honey flow. There is no honey at all about the 10th or 15th of August in some places.

A.—That spray dries in a minute or two and it was only put on very lightly.

Q.—We would like to know whether there has been any prosecution for violations of the law this spring.

The Chairman: None that I know of.

Mr. Pettit: I do not know of any prosecution.

Mr. Clarke: Being a fruit grower myself and in touch with a large number of fruit growers, I know some who have many orchards rented, and they tell me they would pay the fine rather than discontinue spraying. I am told the minimum fine is $5.

PROF. CAESAR: One dollar is the minimum and the maximum is $25.

MR. CLARKE: For my part if I wanted to spray when the trees were in bloom I would not consider $1 or $5 or $25 if it was necessary to continue spraying, because I know the application of the spray would add a great deal more than that to the value of my crop. Sometimes weather conditions are very unfavorable before the blossoms come out, and sometimes the machinery will break down. I had that happen to me this year, and I had to send for repairs, and the blossoms were out before I received them and I had to go on with the spraying while the bloom was out. I did not use any poison. I do not think the poison at that time is of any value. I think if the fruit growers would leave out the poison there would be no harm. We use the Bordeaux mixture or lime sulphur. I had the opinion that it was harmful to use the poison spray on the blossoms, and I think we should have it definitely settled whether it is harmful or not. If it is harmful then the fine should be much larger, and we, as beekeepers, should see that it is enforced. If we did that we would get rid of a lot of the work that is going on at the present time. Some men will persist in using it until they are forced to discontinue.

MR. WM. KROUSE: Has a beekeeper any right to go to a farmer's house in order to find out whether he is using poison or not? It is a delicate thing to go on a farm and look into a barrel in which the spray is mixed to find out whether there is any poison in it.

THE CHAIRMAN: I do not know whether the gentleman is here who spoke about the bad results from the spray that was used on the mustard. He asked the question at the first session whether anyone else had disastrous results from spraying mustard? Unless we can educate the farmer in regard to these matters I am afraid we will get into trouble. Our bees go out and get honey from his place, and if we try to dictate to him we will likely get into trouble.

MR. SMITH: I do not think the beekeepers need to worry about poison in the spray. There is only one case that I know where there is any danger. I live in a section where we grow a lot of fruit and a lot of spraying is done. I am a beekeeper and there is only one time of the year that I know of when there is any real danger, and that is when they are spraying grapes for the beetle. That is early in the year when the bees cannot get any honey from the bloom. and when they have very little to work on. I believe that spray does attract them. In my section several beekeepers complained this year and said they met with very heavy losses. Their hives were reduced to such an extent that it took them all season to recruit.

PROF. CAESAR: I heard of that damage that was done when the grape vine was being sprayed. I looked into that matter and I was of the opinion that there was nothing in that. I was told that I was to blame for the using of the sweetened poison. To the best of my knowledge I have never recommended any sweet poison for that beetle. I recommended nothing but Paris green and arsenate of lead. There is nothing to attract the bee in that.

RESOLUTION.

It was moved by Mr. J. L. BYER, and seconded by Mr. J. W. CLARK, that the Provincial Apiarist be requested to conduct a test as to the effect of poisoned baits on bees.

The motion carried unanimously.

Mr. Ross: Don't you think it would be well to raise the question of increasing the fine for violation of the present law in reference to the spraying of fruit trees?

Mr. Byer: In our neighborhood a farmer was spraying and he said that sooner than stop he could afford to pay the fine.

Mr. Ross: Is there any question that great damage is done to the bees when poison spray is used on full apple bloom?

The Chairman: None whatever.

Mr. Ross: If there is no question about the damage why not have the fine so heavy that people will not violate the law?

The Chairman: Where a poison spray is put on full bloom there is no question about its doing harm. Some years ago when I had only a few colonies of bees some boys at the College were sent out to spray with instructions not to spray the trees in full bloom, but they did not carry out their instructions and they sprayed right along, and my colonies went down to practically nothing. Inside of four days you could shovel them up off the ground.

Mr. McIntyre: In my neighborhood there are a number of fair-sized orchards, and in the last two years, when the apple blossoms were in full bloom, I could not walk through my yard without stepping on bees. I knew these men were spraying but I could not tell what they were using, but I always attribute it to the poison used in the spray.

Mr. H. G. Sibbald: I have had plenty of evidence from beekeepers that there is a great loss when the trees are in full bloom. A great many beekeepers know that there is a great loss when the apple trees are sprayed in full bloom. I have heard it said that the fruit men would rather pay the fine than stop the spraying. I am going to move that the minimum fine be increased from $1.00 to $25, and that we ask the Government that the maximum fine be $100, and that a committee be appointed to wait on the members of the Legislature and present that resolution.

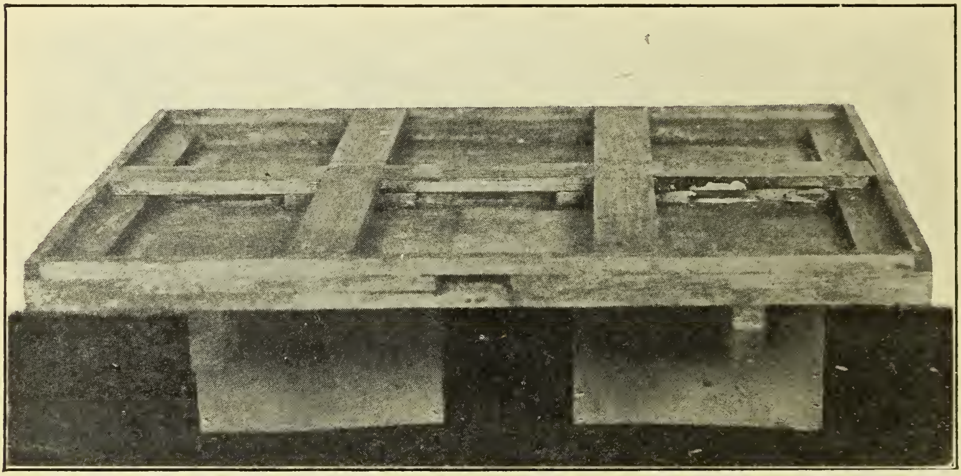
Mr. Ross: I second that motion. For one or two men who will advocate spraying trees in full bloom you will find fifty who will say that it is harmful. Therefore, I have absolutely no hesitation in seconding this motion. I think it is something in the interest of the beekeepers.

Mr. Clarke: Being a member of the Fruit Growers' Association of Ontario I am deeply interested in fruit growing. We know that the bee is our best friend, but there is one thing I would like to have settled before that motion is carried, and that is to have absolute evidence that the poison does injure the bees. We have a number of beekeepers who think it does injure the bees. There are a number of beekeepers who think it does injure the bees. If this fine is increased and there is a law suit, then the fruit growers will get evidence on the other side, and the judge would simply throw the case out. I think we should first settle it by experiments in Ontario that spraying in full bloom is dangerous. I think it would be better to leave this motion for another year until this is definitely settled. I do not think it is necessary to use any poison when the blossom is in full bloom. Unfortunately a great many have the mixture made up with the poison in it and they go on using it after the trees are in full bloom.

Mr. McIntyre: I think if these gentlemen lost $500 every year for a few years they would want that law changed and the minimum fine made $100 and the maximum $1,000. I have had the bees laid out all over the yard. Not the old bees but the young bees. The old bees carry home a load of honey that has been poisoned and they do not die in the hives. They are well enough to turn around and start out for another load, but they never come back. I have had colonies reduced to almost nothing when the spraying has been going on. It gets your strongest colonies. If it comes to a case in court the only thing a beekeeper has got to do is to take a few of the bees to a chemist and he will be soon able to prove his case.

A MEMBER: When the Act was passed was not there sufficient evidence produced to convince the Legislature that it was necessary.

MR. SIBBALD: At the time the Act was passed the Committee of the Legislature summoned a committee from the beekeepers and from the fruit growers, and from the evidence given they came to the conclusion that the law would not do anybody any harm. It would not do the fruit man any harm because he could spray after the blossoms fell off and it would answer the same purpose. The evidence went to show that the bees were poisoned by spraying the blossoms in full bloom. If this question is laid before the Legislature in January Mr. Clarke can ask that the fruit men be heard and we can produce evidence to show that our bees are poisoned by the spray.



Stand used by Mr. Deadman for having extracting combs cleaned by bees of one colony.

Q.—Does Mr. Clarke believe that a good shower of rain in fruit bloom will be a detriment to the blossoms?

MR. CLARKE: It depends on how long it lasts.

A MEMBER: I have always been under the impression that a heavy rain was a detriment to the fruit setting. If the heavy rain is a detriment then a shower of rain must be harmful.

MR. CLARKE: If we get a rain so that the bees cannot work on the blossoms then it is bad.

MR. ROSS: I do not think there is any question about the high mortality among bees from spraying trees when they are in full bloom.

MR. CLARKE: This Act has been in force for a good many years and I have yet to hear of a single conviction.

MR. SIBBALD: A member of this Association had a man convicted; his farm was near Collingwood.

THE CHAIRMAN: The motion is by MR. SIBBALD, seconded by MR. ROSS, that a deputation be asked to wait on the Minister, that the fine be increased from a minimum of $1 to $25 and a maximum of $100. Carried.

On motion by Mr. SIBBALD, seconded by Mr. MARSHALL, the following committee were appointed to wait on the Minister of Agriculture for the Province of Ontario and urge upon him the increasing of the fine for violation of the Spraying Act: James Armstrong, Mr. J. D. Evans, Mr. H. D. McIntyre. Carried.

DEMONSTRATION WITH SOME APPLIANCES ON EXHIBITION.

G. A. DEADMAN, BRUSSELS.

I am going to speak on two subjects only. The first is "The Best Way to Clean the Combs after They Come from the Extractor." Some beekeepers say to put them away just as they are. We like to clean them.

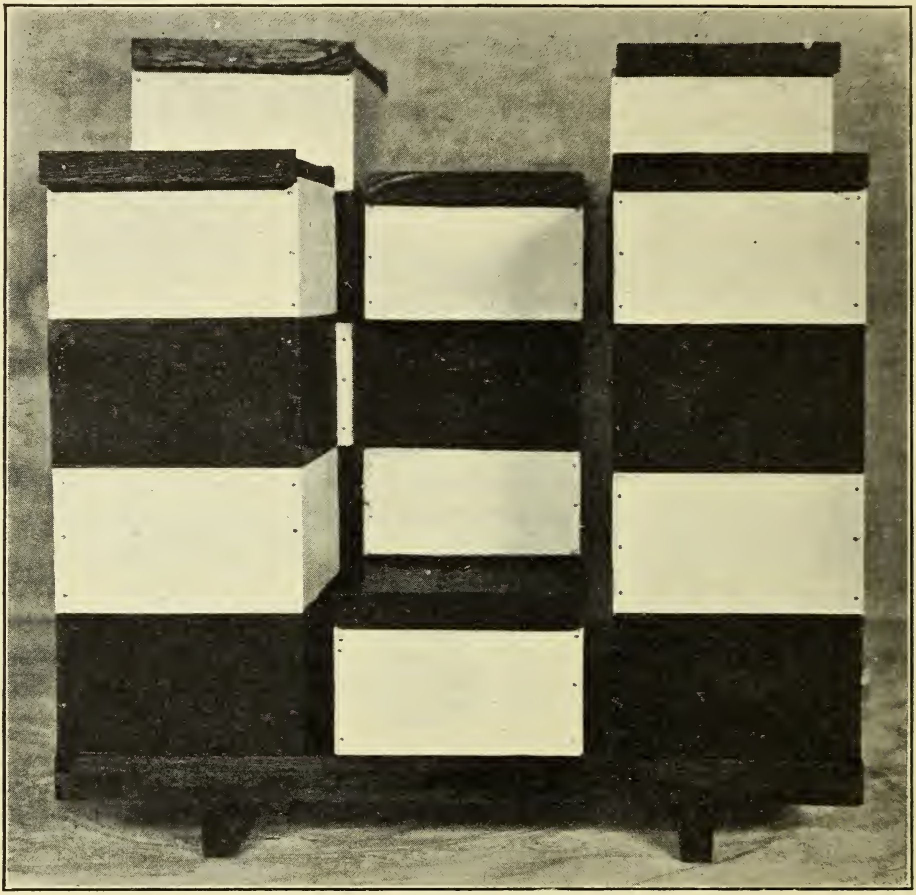
I want to explain how some people have these combs cleaned. There are various ways of doing it.

A hive containing a strong colony of bees is placed in the centre front of the stand or platform. Then five supers (more or less) are placed on each of the four corners, and five more directly behind the hive containing the colony of bees which are to do the cleaning of the comb. The entrance is very small because robbers are inclined to try and get into the hive. We put the supers on five or six high, put as many on as you can. You make this stand out of matched lumber so that the bees cannot get up from below. Take a strong colony that is able to cover a couple of supers and place in the centre. When we first began this we used to have one colony of bees do all the cleaning up.

The only precaution you have to make is to see that the strips are wide enough so that the bees can get into the supers. The bees get underneath and commence at once to clean up, and instead of storing the honey in the individual hive they put it in this one super or two or three. The honey will be first class. You will find some sections completely filled but not capped. If you have some sections that you cannot sell you can make them into first-class sections by a plan like this. You must be careful not to have the entrance too large. If we have a number of combs to clean up we make 8 or 10 of these stands.

MAKING SUGAR SYRUP.

We are all interested in that subject. I presume there are very few beekeepers who do not feed their bees. The best way to make sugar syrup is not by stirring it or heating it. I would not recommend this plan for a beekeeper who is only feeding a few colonies. The way I got to do this first was from making sugar syrup in connection with a drug store. Instead of making it by heating the sugar and water we just simply put it through a percolator. A percolator is very much like a funnel except that it does not come down in the same way. Instead of doing it in the same way that it is done in the drug store, because there it is done on a small scale, we take a 600 lb. barrel. All we use is water and sugar. Before putting the sugar in the barrel we bore a quarter inch hole near the bottom of the barrel. You must protect the sugar from falling into that hole and in order to do that we get strips a couple of inches wide and put them across the barrel so as to keep the sugar from getting to the bottom. Over these strips we put clean sugar bags and we make a kind of an arch so that when the syrup gets down there it will have free access out of this hole. After that is all done we pour in the sugar and then add the water. You speak of under-draining, and say that it works while you sleep. It is the same with this method of making sugar syrup—it works while you sleep. This year we simply took two barrels and we put five bags of sugar in each barrel. You pour on the water slowly at first, but after it is going nicely you put on as much water as is required. Be careful not to put on too much water at once. If there are six inches of water over the sugar it will do no harm for a while, but when it gets down half way in the barrel you must then be careful and keep the sugar covered only, because the water will work down too fast and spoil the work. Keep adding the sugar and see that it is kept level. You have a tin to catch the syrup as it comes out and you must see that it is emptied at intervals and that it does not overflow. In this way we can make up 800 lbs. of syrup in a day. We begin feeding about five o'clock p.m., and we can feed the 800 lbs. in one day. We fed about 5,000 lbs. of feed this year. You should feed the syrup warm. You should not feed cold syrup. In order to do that you can make some on the stove and that will help to warm up the other, and in that way the work is divided. Syrup made in this way will not granulate, but it is as thick as you require it. I never tested it for its specific gravity, but I know it is just right for the bees.



Stand for cleaning combs. A colony of bees is seen in front centre, supers are stacked on other spaces. Bees from colony get to them from underneath.

Q.—Do you use cold water?

A.—Yes, cold water; and it is not necessary to measure it. All you have to do is to pour in the sugar and the water. It will take about one hour from the time you put in the water until the syrup is coming out. You just have one thickness of the burlap under the sugar. You must be careful not to have the syrup run too fast because you will get too much water.

Miss Pettit: Do you fill the barrel right up at once?

A.—Yes, and we never let it get lower than half way down in the barrel. We keep putting in more sugar and water.

Q.—Do you put the water in at once?

A.—Yes, just as soon as the sugar is in. After the syrup once starts to come it will run a steady stream, and you must be careful to see that it is not running too fast. It takes about 36 or 48 hours for a colony of bees to empty a feeder containing 20 lbs. of feed. This year we had about 150 feeders and we used 1,000 lbs. of feed the first day. It took 75 of these feeders and we had 75 ready for the next day. Some people say that it is a great trial to feed syrup, and that is true if you feed in the ordinary way; but when you use sugar syrup in the way I have described it makes the work very light. For a feeder we use a comb-honey super and we leave the bee space all around. It is just an ordinary box about five inches high and the bottom is covered with paroid and a little strip to keep the paroid on, and we wax around the corner. Of course, you can use boards for the bottom if you like.

Q.—Do you use a float?

A.—We put in some oat straw. That will keep the bees from getting drowned.

WIRE QUEEN-EXCLUDER.

W. J. Craig, Brantford.

It is for the purpose of getting your opinion on this queen excluder that I am before you at this time. Most of you are aware of the fact that on account of the war the zinc market is in a peculiar position and it is almost impossible to get zinc. This put us in the position of making enquiry to find out if there was anything else that would be suitable for a queen excluder. This substitute that I now show you has been recommended, but before putting it on the market we want to have the opinion of the beekeeper. We make it the full width of an 8 or 10-frame hive and it is made of ridged steel wire. These reinforcing wires make it perfectly ridged. We would like to have your opinion as practical beekeepers of this excluder.

Mr. H. G. Sibbald: I like the idea of your excluder better than the one that is manufactured of 3 or 4 wires. When we first used the zinc excluder it was not by any means perfect because the air could not pass through freely. I like the openings in your excluder all right. I do not suppose those wires will bend. I would like to ask as to the difference in price.

Mr. Craig: I have not got the exact cost, but I am under the impression that we can produce this queen excluder for very little more than the price of the zinc excluder at the present time. It is all made of steel wire.

Mr. McIntyre: Could that be made with wood on one side only.

Mr. Craig: I do not see how it could be. The wood frame serves to bind the wire, and is almost essential to it. It gives the bee space on the one side.

Mr. Clarke: I think these wires will bend in handling unless that excluder is handled very carefully, and if one of those wires was bent slightly the queen would be able to get out. I would suggest an extra bar through the centre.

Mr. Craig: These wires are reinforced by cross wires as you see.

Mr. Clarke: If there was another cross-bar it would remove all possibility of the queen escaping.

Jas. Armstrong: I have run across a great number of these excluders and I have met all kinds of beekeepers, and I have yet failed to see one of these wires bent or rusted.

Mr. Clarke: I think it is a better excluder than the zinc excluder.

Mr. Pettit: We have had the queen excluder made by the Root people in use at the College for five or six years, and we find it very satisfactory. This excluder appeals to me very strongly, provided it will stand up as well as the other. That is a matter for test. I think the manufacturer should go ahead and make them and send them out to be tested. I would not be afraid to buy some and put them out for actual test in the apiary.

Mr. Craig: It would be cheaper for us to make them with a wooden slat in between than with the wire.

BEEKEEPING TERMS.

Afterswarm.
Alighting-board.
Artificial swarm.
Beebread.
Bee-culture.
Bee-disease.
Bee-escape.
Beeglue.
Beegum.
Beekeeper.
Beekeeping.
Beehive.
Bee-journal.
Beemoth.
Beespace.
Beesting.
Beeswax.
Beeway.
Bee-yard.
Bottom-board.
Box-hive.
Brace-comb.
Brood-chamber.
Brood-comb.
Brood-nest.
Brood-rearing.
Burr-comb.
Cell-protector.
Cellar-wintering.
Chunk honey.
Closed-end.
Comb-foundation.
Comb-honey.
Division-board.
Double-walled.
Drone-brood.
Drone-cell.
Drone-comb.
Drone-trap.
Extracted honey.
Extracting-house.
Field-bee.
Five-banded.
Foulbrood.
Foundation-fastener.
Granulated honey.
Hive-stand.
Hive-tool.
Honeybee.
Honey-board.
Honeycomb.
Honeydew.
Honey-extractor.
Honey-house.
Honey-plants.
House-apiary.
Movable-frame hive.
Multiple winter-case.
Nonswarming.
Outapiary.
Outdoor wintering.
Outyard.
Packing-case.
Pickled-brood.
Queenbee.
Queencell.
Queen-excluder.
Queen-rearing.
Queenright.
Queentrap.
Queen-and-drone-trap.
Royal jelly.
Section-folder.
Section-holder.
Self-spacing.
Shade-board.
Shaken swarm.
Shipping-case.
Single-walled.
Slumgum.
Spring dwindling.
Thin-super.
Three-banded.
Travel-stain.
Wax-extractor.
Waxmoth.
Winter-case.
Wire-embedder.
Worker-brood.
Worker-cell.
Worker-comb.

There has been much divergence in the way that compound terms used in beekeeping are spelled, and it seems desirable that a convention as to the spelling of them should be established. The above list is approved by Dr. E. F. Phillips, in charge of Apiculture Investigations for the United States Government, also by Dr. C. C. Miller, the foremost writer on Apiculture in America, Mr. C. P. Dadant, Editor of the "American Bee Journal," Mr. E. R. Root, Editor of "Gleanings in Bee Culture," and myself; and it is suggested that these terms be written as here indicated.

Morley Pettit,
Ontario Provincial Apiarist.

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FORTY-SEVENTH ANNUAL REPORT

OF THE

Fruit Growers' Association

OF

Ontario

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1916

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Corner Queen and John Streets
TORONTO

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Forty-seventh Annual Report of the Fruit Growers' Association of Ontario.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,
TORONTO, 1916.

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Fruit Growers' Association of Ontario

OFFICERS FOR 1916

President	DR. A. J. GRANT, Thedford.
Vice-President	F. A. J. SHEPPARD, St. Catharines.
Secretary-Treasurer	P. W. HODGETTS, Parliament Buildings, Toronto.
Executive	OFFICERS and ELMER LICK.
Transportation Agent	G. E. MCINTOSH, Forest.
Auditor	D. CASHMAN.

DIRECTORS.

DIV. 1.	R. B. WHYTE, Ottawa.	DIV. 8.	F. A. J. SHEPPARD, St. Catharines.
2.	E. CASSELMAN, Iroquois.	9.	P. ANGLE, Simcoe.
3.	F. S. WALLBRIDGE, Belleville.	10.	DR. A. J. GRANT, Thedford.
4.	J. G. WAITE, Wicklow.	11.	C. W. GURNEY, Paris.
5.	ELMER LICK, Oshawa.	12.	A. STEPHENSON, Longwood.
6.	W. F. W. FISHER, Burlington.	13.	A. BROWN, Owen Sound.
7.	R. H. DEWAR, Fruitland.		

Ontario Agricultural College: PROF. J. W. CROW.

Vineland Experiment Station: F. M. CLEMENT.

REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS.

Canadian National: H. T. FOSTER, Burlington.
London: DR. A. J. GRANT, Thedford; ALBERT STEPHENSON, Longwood.
Ottawa: W. T. MACOUN, Ottawa; D. JOHNSON, Ottawa.
Ontario Horticultural Exhibition: ELMER LICK, Oshawa; R. H. DEWAR, Fruitland; H. T. FOSTER, Burlington; and P. W. HODGETTS, Toronto.

COMMITTEES.

Horticultural Publishing Company: P. W. HODGETTS, Toronto.

New Fruits: W. T. MACOUN, Ottawa; PROF. J. W. CROW, Guelph; F. M. CLEMENT, Vineland Station.

Historical: A. W. PEART, Burlington; W. T. MACOUN, Ottawa.

TREASURER'S REPORT, 1915

RECEIPTS.	
Balance on hand, Dec. 31, 1914	$708 25
Fees, 1915	309 10
Fruit sold	8 42
Grant	1,700 00
Miscellaneous	19 20
	$2,744 97

EXPENDITURES.	
Annual meeting	$93 75
Committees	144 52
Periodicals	728 00
Transportation	1,392 66
Printing	46 75
Miscellaneous	31 70
Balance on hand	307 59
	$2,744 97

DETAILS OF EXPENDITURES.

ANNUAL MEETING.	
Reporting, Maud E. Coo	$50 00
Printing, J. Frank Osborne	35 00
Expenses, W. J. Saunders	8 75
Total	$93 75

COMMITTEES.	
Directors' Meeting:	
Dr. Grant	$20 45
Geo. French	47 70
P. W. Hodgetts	4 30
Elmer Lick	56 92
C. W. Beaven	15 15
Total	$144 52

PERIODICALS.	
Canadian Horticulturist	728 00

TRANSPORTATION.	
G. E. McIntosh, services and expenses	$1,392 66

PRINTING.	
College Press, membership cards (post cards) $36.00; letterheads and envelopes (directors) $10.75	$46 75

MISCELLANEOUS.	
Exchange	$1 70
Audit (2 years)	20 00
Dominion of Canada guarantee	10 00
Total	$31 70

Fruit Growers' Association of Ontario

ANNUAL MEETING

The fifty-sixth annual meeting of the Fruit Growers' Association of Ontario was held in the Carls-Rite Hotel, Toronto, on January 19th, 20th and 21st, 1916.

At ten o'clock on Wednesday morning, January 19th, 1916, President Elmer Lick, Oshawa, called the meeting to order.

PRESIDENT'S ADDRESS.

Elmer Lick, Oshawa.

As President of the Ontario Fruit Growers' Association I am glad to welcome you to the annual meeting of the Association.

During the past year death has removed the immediate Past-President of the Association, the late Robert Thompson, of St. Catharines. This has been a very serious loss to the Association, and to the fruit growing interests of the Province of Ontario. The late Mr. Thompson with his unselfish desire for betterment of all fruit growers was ready at all times to advise with all fruit growers of the Province of Ontario who desired his advice. His knowledge of the fruit conditions and markets was always helpful in any discussion. His confidence in co-operation as one of the main factors in the ultimate solution of marketing problems was always an encouragement to advancement. We mourn his loss as of a teacher, a friend, and a counsellor.

The late Major A. L. Kimmins, of Winona, left Ontario for the battle fields of France. He gave his life for his country. His deep interest in and business relation to the fruit industry of Ontario is so well known that it is only necessary to mention the fact to cause deep regret that another has left work here. This loss is a direct one to fruit growers, and is one that can be laid to the war.

The war in which Europe is engaged has already caused the fruit growers of Ontario a very heavy loss. The loss of life while not great as yet, is likely to be more serious in future. The interference with and increased cost of transportation, and in some cases lessened demand has interfered with the marketing of fruit to a serious extent. One feature that must be faced is the necessity of increased revenue for war purposes and the certainty of heavier taxes to raise this revenue.

The crops of fruit grown in the Province were probably never grown under such varying conditions. The returns from small fruits were variable according to location. Dry periods shortened and lessened the strawberry crop. Wet weather in many sections destroyed the last part of the raspberries. The plum crop was very large and not profitable. Peaches were never sold cheaper in the small towns of Ontario. It will be interesting to learn whether the grower received prices that were remunerative or not. A few years ago a basket of peaches worth to producer 40 to 50c. sold to consumer at $1.00. Now when the price to consumer is 50 to 60c. what does the producer get. We hope that when these questions are considered on Thursday morning that we will be able to learn that it is possible by advertising and co-operation to so market peaches at a price that will very greatly increase the possible number of consumers, and yet leave the producer a fair living wage.

The apple crop was very light, and the quality as bad as ever was known. In the western part of Ontario the crop was very light and scab and inkspot generally prevalent. The crop east of Toronto was larger than west of Toronto but similar conditions prevailed. The high cost of transportation rates to England and inferior service, often a month from loading to selling, has resulted in very serious injury to fruit with very low net returns. The western market was keen and took about all that was available, and at prices which were high. The crop was very much lighter in Eastern Ontario than was expected, many orchards which should have had a full crop, were light. This is to be regretted. Result will be that orchards which would in natural course of events have given a light yield will for 1916 be heavily loaded thus adding to the certainty of a very large crop for 1916. Apples for several years back have averaged about $1.00 per barrel more in the odd years than in the even years. Thus a car of mixed varieties that was worth $3.00 to $3.25 f.o.b. in 1915 was worth $2.00 or thereabouts in 1914, was worth $3.00 in 1913, and in 1912 about $2.15. The probability is that we may expect a $2.00 price for 1916. What can we do as fruit growers to regulate the bearing of apples, so that we can get a more even crop year after year? That question is not on the programme but is one of the most important that can be considered. There is one phase of this that is beyond our control and that is the weather conditions. As fruit growers we are very largely dependent on the weather for our returns.

The crop of apples in 1916 is likely to be large all over America. The marketing conditions are beyond our knowledge. If European demand is small, as seems likely, then in order to get a fair price in Western Canada competition with British Columbia and Western states will be a problem. Several of the subjects for Friday have to deal with the marketing of apples.

The programme of this meeting is very largely co-operative, nearly every subject being along some line where the central thought is co-operation. It is expected that as a result of the discussions at this meeting a decided step forward will take place in the co-operative work of the fruit growers in the Province.

Fruit growing is one of the most noble callings, the returns have paid well during the past few years. It is likely that as increased supplies from large plantings come into markets that unless the expenses between the producer and consumer are very much lessened that the net results to the grower will be very small.

On the other hand, if the price to the consumer can through co-operation be kept low, and at same time transportation and distribution expenses reduced to lowest possible points; then through the larger market resulting from low prices, there can yet be returns to the grower that will pay well for the labor of production.

We have reason to thank our Ontario Government for its continued interest in fruit growing and also our Secretary, Mr. P. W. Hodgetts, for his highly valued services. We regret that the Fruit, Flower and Honey Show could not be held again this year owing to no satisfactory building being available.

We, as fruit growers, are deeply indebted to the Fruit Branch at Ottawa for services rendered. The crop reports and telegraphic reports bi-weekly have been of very great value to the fruit growers and I hope will be remembered by a suitable resolution thanking the Hon. Martin Burrill, Minister of Agriculture, for the interest taken in fruit growing, and for the means provided thus making it possible to furnish fruit growers with such practical and helpful information. I hope also that such resolution will remember the fruit Commissioner, Mr. D. Johnson, the active, energetic head and guiding hand in the preparation of this valuable information.

One of the principal lines of work of this Association is the work of Mr. G. E. McIntosh, Transportation Agent. His work has been of very great value and when presented will speak for itself.

My final word is to plan carefully, and economize on labor and expenses. Cooperate in every way possible to lessen difference in price between producer and consumer. Pack and grade to high standard and no matter what comes as result of war we yet can as fruit growers, with the record of our past work on our minds, meet with confidence the difficulties of the fruit grower as they present year by year to us their ever varying problems. With confidence in the quality and reputation of our fruit let us demonstrate to the Canadian people and to the world that our fruit may have equals, but no superior.

TRANSPORTATION REPORT.

G. E. McIntosh, Forest.

As the different grievances of the fruit growers and the grounds upon which they base their claims for improvements of transportation service have been fully presented by me at previous meetings of the Ontario Association, and also at the Dominion Conference held in Grimsby a little over a year ago, my remarks to-day will be directed more to a review of the work carried on through your transportation department for the past year only.

When I first attempted this work in your behalf a few years ago there was need of a systematic effort, Dominion-wide, to obtain proper shipping facilities for the fruit industry in Ontario, and in each of the other fruit-producing Provinces although British Columbia has probably very little reason for complaint at the present time. That need exists to-day. Here in Ontario, this work has been undertaken with some determination, and with a measure of success, nearly all which success has been beneficial to other Provinces. We have endeavored to add to our effort the past year an educational campaign; first by attendance at meetings of several of the local Associations, in the early part of 1915, particularly those not affiliated with the Ontario Association; and during the shipping season, by bulletins and circulars surrounding the shipping and marketing problems, court and commission rulings that would be helpful to the growers and shippers. These have in many instances been of great assistance to the shipper, and we also have instances reported where the circulars were the means of preventing financial loss.

The agricultural industry is to-day producing over one-third of the total freight earnings of the railways of Canada. and yet the shipping end of this industry is probably given less attention than any other branch. Boards of Trade, manufacturers, grain growers, millers, lumbermen and nearly every organized body of shippers find it necessary to continually study and interpret the transportation and marketing problems, and the longer I follow this work for the fruit growers the more thoroughly convinced I become of the fact that as shippers of a valuable, but a perishable commodity—the product of an infant industry—there will be transportation difficulties that will require constant attention for the welfare of the industry.

It is quite true that the prosperity of our country depends largely upon the railways, and Canada is still in a condition that railways and more railways are a necessity to its prosperity, but it is up to those who represent the different industries of our country just as you represent the fruit industry to see to it that commercial progress and development is not checked by the imposition of prohibitory freight or express charges, conditions or privileges by those who know little of the productive or marketing conditions; but rather that they encourage these industries to the very limit. In regards to the fruit industry here in Ontario my experience has been that the railways are willing to co-operate in some ways, but their method of proceeding is mighty slow without the aid of the Railway Commission.

The people want the railways to do well. We are interested in them, but we are opposed to those who monopolize the corporations, absorb their earnings by increased watered stock or otherwise burden them with a debt which they try to pay for out of the traffic furnished by the public, and yet we leave it in the power of these companies to fix their own rule of conduct. In other words, we are, as a people, without the reins of power for remedying many of the little details that make marketing a success, because of the limited power we give our Railway Commission. As I have before pointed out:

It has no power to award damages for delay in transit.

It cannot issue an order in reference to rough handling or pilfering.

It has no jurisdiction over the settlement of claims.

It cannot issue an order in reference to delays, jolting or rough coupling.

It has no jurisdiction over navigation companies, other than those controlled by a railway company.

It cannot issue an order for the extension of a privilege.

The Commission may mediate, report, advise, investigate, order—all good things in themselves, and sometimes very effective, but when it comes to the vital point of enforcing necessary rules of action as above, it is absolutely helpless. Let the law or let there be legislation to extend the jurisdiction of the Board whereby they can furnish the rule of conduct, and let the railroad pay the penalty if it fails. No service which the Government undertakes can be more useful, and no duty which rests upon it more imperative than to secure for the public always and everywhere equal treatment by every railway carrier. The purpose of such legislation, as I pointed out in Grimsby, briefly defined, would be as follows:

To enable shippers to secure cars in reasonable time.

To enable farmers, stockmen and fruit growers, to promptly market perishable freight.

To empower the commission, when necessary, to provide a minimum speed limit.

To enable contracts to be made and carried out on a basis of reasonable service.

To make railroads responsible for failure of such duties.

To fix reasonable penalties to ensure reasonable service.

To ensure proper handling of shipments.

To enable the Railway Commission to make rules and regulations with respect thereto.

To provide for the establishment of reasonable reciprocal demurrage charges.

To secure under proper rules the unloading and releasing of cars by shippers.

To exempt railways from penalties where compliance with the law is prevented by cause not reasonably anticipated, or from accident.

Railroads which give reasonable service need not fear such a law; those which do not give such service should be compelled to do so.

Give shippers a fair show to secure a fair service for a fair rate.

I simply point out these facts relative to the powers of the Railway Commission to show that in quite a few instances shippers cannot secure, even on application to the Commission, concessions that appear to be an absolute necessity for market extension. Therefore, many complaints have been dealt with and will have to continue so by personal discussion with representatives of the different railway and express companies, and through the Canadian Freight Association.

As I previously pointed out, the educational campaign by bulletin or circular, was inaugurated, and a limited number issued for circulation, and in this work the Dominion Fruit Division assisted. Other matters dealt with were as follows:

In February last the Canadian Freight Association on behalf of the railway companies under the jurisdiction of the Board made application for a general increase of freight rates. It was proposed to advance class rates 1c. fifth class, and to practically wipe out the Fruit Commodity rates to Western Canadian points, substituting therefore a rate advance of from 5c. to 30c. per 100 pounds. Two sittings of the Board were attended in behalf of the fruit interests, an effort being made to show:

(*a*) That the increase was unwarranted and would be highly prejudicial to the fruit interests generally.

(*b*) That an increase would hamper and deter expansion of the fruit trade.

(*c*) That it would minimize orchard development and lessen production.

(*d*) That it would create an advantage to our competitors in the western Canadian markets.

This commodity rate was first established by an order of the Board in 1904, when fresh fruits were lowered from third to fourth class rate in carlots to Winnipeg, Portage la Prairie and Brandon. Other points were added by the railways in 1908, and as late as 1914 still other points were added without request. It was pointed out that the establishing of this rate relieved for the Ontario growers a threatened condition of over-production of fresh fruits, it opened a market that not only resulted in encouraging increased planting and an extension of producing districts, but it developed a freight tonnage of from four carloads in 1904 to about 750 carloads to the western markets in 1915. The counties of Prince Edward, Northumberland and Ontario, in Eastern Ontario, and Lambton County in Western Ontario were developed as fresh fruit centres under this tariff, and with the proposed increase of about $50 a car, Eastern Ontario would be ruined as a producing centre, because the larger producing section would have to flood their local markets, and they are not producing in sufficient quantity to compete.

With prospects of greater production and the present depressed conditions growers require greater advantages in the western markets than they at present have. Ontario has to compete in that market against the western Province, with its shorter haul, and against the States of Washington, Oregon, Idaho and Montana, which market these States use as a dumping ground, and thereby regulate the prices. This being the condition an increase of freight rates from Ontario could not be met by increased prices for the product, and would, therefore, create a decided advantage for our competitors. The States I have mentioned marketed last season in 47 different Western Canadian cities at a freight rate of from 80c. to 1.12½ on soft fruits and a blanket rate of 75c. on apples. In fact it is only in the nearby markets of the West that we can successfully compete even under present conditions. The proposed increase would mean an additional charge of

$58.00 per car to Battleford and North.
48.00 per car to Brandon.
52.00 per car to Camrose.
52.00 per car to Edmonton.
56.00 per car to Medicine Hat.
56.00 per car to Saskatoon.
30.00 per car to Winnipeg.
44.00 per car to Portage la Prairie.

The decision of the Board on this appeal has not yet been given and the old rates stand for the present.

In connection with this appeal it is interesting to note that while the Interstate Commerce Commission recently permitted an increase of freight rates to American railways having a higher average in earnings per mile of line, than the Canadian railways and this might be used in argument favoring a reduction, but their expense is also higher, and as an instance we might refer to taxation. In 1913 the earnings per mile for American railways was $3,582.00 and taxes amounted to $444 per mile. The same year the earnings per mile for Canadian railways was $2,512 while their taxation was but $83.00 per mile.

We were again threatened with an increase of freight rates by the Canadian Pacific Railway and Grand Trunk Railway filing notices that they would withdraw the concurrence filed with the Railway Commission, the effect of which was to concur in joint tariffs issued by the Canadian Northern Railway lines west. The Canadian Northern Railway retaliated by revoking its concurrence in joint tariffs issued by either the Canadian Pacific or Grand Trunk Pacific.

The board has within the past few weeks made it clear that under the railway act joint rates are obligatory, and while all the railways concerned seem at least to agree in an effort to get rid of them, in view of their action; joint rates as contemplated by the act are intended for the general convenience of the public, so as to facilitate the movement of the freight traffic, and the companies will not be allowed to destroy the system. The withdrawal of this tariff would undoubtedly have meant a very large increase in freight rates.

Our appeal for one-third rebate on L. C. L. shipments to concentration points for re-shipment in carloads was again referred to the Board, and I am advised an order covering this will be issued at the same time as the order covering the eastern freight rates case.

You will remember a recommendation made in my report and adopted at the 1913 meeting of this Association that navigation companies be placed under the jurisdiction of a bill in the House of Commons, covering the recommendation which created some excitement among the different navigation companies. The whole matter arose from the refusal of the Northern Navigation Company to accept freight shipments for Sault Ste. Marie. The past season, however, I am glad to report, the Soo service was re-established, and was of a great benefit to the Western Ontario shippers.

The other recommendations for amendment of the Railway Act adopted by this Association, whereby punishment could be meted out to rough handlers, and placing the control of privileges and concessions under the Board of Railway Commissioners were introduced in Parliament in the form of Bill 85, given one reading and referred to a joint committee of the House and Senate in which stage it has yet to be dealt with. The breaking out of the European war stopped the passage of all legislation except measures for war purposes, and we, therefore, cannot press the matter.

All shippers will more or less appreciate the establishment the past season of the L. C. L. commodity rate on apples to the principal western markets. The old rate to Winnipeg for instance for L. C. L. shipments was $1.08 per 100 lbs. The new rate is $1.02 in bags or boxes and 81c. in barrels. Other points are covered by similar reductions.

In regard to mixed cars of fruit and vegetables to points east of Port Arthur. An effort was made to allow the mixing of all vegetables with fruit at the fourth class rate. This, however, was not conceded, but it was generally understood that tomatoes should be classified as fruit, and I think in most instances were accepted as such.

The shippers from Queenston and Niagara-on-the-Lake were successful in having established a joint tariff covering shipments via Canada Steamship Lines and Canadian Northern Railway express, which was a decided advantage in reaching points east and north of Toronto, situated on the Canadian Northern Railway lines. I may say an effort is now under way for a still more favorable service for the shippers at the points mentioned, and covering a greater area, but at the present I cannot speak definitely enough to refer to the matter in detail.

During the year we have succeeded in having a team track and a fine fruit shelter constructed at Forest, which have been of spendid service to the shippers at that point.

The supply of refrigerator cars was a serious matter a few years ago, and while even now there are times when considerable delay is experienced yet we must agree the service has greatly improved. Realizing the importance of having cars when the fruit is ready to move, I have endeavoreed to impress this upon the railway representatives, and have the past two years with your assistance been able to supply them before the rush comes, with a fair estimate of the number of cars that will be required and the probable shipping period at each point. This has been appreciated by the railways, and they assure me it is a great help in arranging for an adequate supply of cars. One of the railway companies which we criticized two years ago for having gone behind in its refrigerator car equipment from 955 cars in 1908 to 941 cars in 1912, is to-day credited with having 1,990 refrigerator cars, while other lines have also made some increases, there being 4,716 refrigerator cars to-day compared with 2,466 in 1909. It requires an equivalent of say 100,000 cars to market the fruit and vegetable crop of Ontario. These cars have an average haul of 216 miles. The total box and refrigerator car equipment of all the railways operating in Canada is 151,323, so that approximately two-thirds of the entire freight car supply would be required to move the output of this great industry. In 1914 during the apple movement in Ontario my records show that more refrigerator cars were required for this commodity alone than all the Canadian railways possessed. However, we appreciate the fact that the supply is now being increased. In 1909 there was one refrigerator car for every 2,023 of the population. To-day there is one for every 1,696 of the population.

It has been a difficult matter to keep acquainted with proposed changes in the Canadian freight classification, and we, therefore, appreciate a recent order of the Board of Railway Commissioners in which the Ontario Fruit Growers' Association is included in the list of those who are to receive a copy of all proposed changes by the Canadian Freight Association, and thirty days allowed for filing objections.

It is difficult, if not impossible for the average fruit growers to become thoroughly familiar with classifications, railway or express tariffs and the many supplements and changes.

Therefore, we purpose to further the work of transportation bulletins by undertaking to keep the shippers advised of the existing privileges under these tariffs, and any changes that may effect the movement of the crop.

This covers briefly the more important matters accomplished during the year. Many complaints have been received, also several suggestions for improved service. In each instance a careful investigation was made and consideration given the different suggestions. At the present time negotiations are being carried on with a view of having several of these complaints dealt with by the carriers in a way that will be satisfactory to the shippers.

I might report that the request for a team track at Burlington Junction has been brought before the proper railway officials, and they appear to favor the construction of such; but first of all must they have permission of the council to cross the public road east of the depot, which has not up to the present time been secured. To those who may be present from that point I would suggest that there be no time lost in having their council take action so that the work, if it is granted, can be placed in the railway company's estimates for next season's improvements. It was my privilege to look over the situation at Burlington and I quite agree with shippers that their request is reasonable. Our efforts in their behalf, however, are blocked until the local matter referred to receives attention.

A request has been made for a fruit shelter at the same point. This also is being held back because of the delay in having the town council take action *re* the crossing.

Beamsville shippers require better facilities for receiving shipments at the H. G. and B. terminal. The present shed is quite inadequate for properly protecting and assorting the amount of express L. C. L. shipping that is being done. Complaint of these conditions and also the track loading facilities were forwarded to me, and are now before the superintendent of the line for consideration. He has requested that I meet him in the near future to go into the matter thoroughly. Up to the present the correspondence is not very favorable to any change being made, but we feel the H. G. and B. Co. will endeavor to remedy conditions in some manner, and avoid a reference of the complaint to the Commission.

The following requests were presented to the Canadian Freight Association:

(1) That the privilege granted previous to the season of 1914 to mix carloads fruit and vegetables shipped to Ontario and Quebec points, at 4th class rate, be continued.

(2) That the classification be amended whereby an attendant can be sent with one or more heated refrigerator cars or box cars in which stoves have been placed to protect the property, and said attendant be given free transportation both ways.

(3) That whereas shippers have been charged freight on the weight of false floors and fittings supplied for refrigerator cars on Western shipments, an allowance of at least 700 lbs. from the carload weight be made in addition to the $3.00 now allowed for material.

Mr. Ransom, the chairman of the Association, advised me that the railways represented by the Association were not agreeable to granting application covered by items 1 and 2. In regard to item 3, dealing with an allowance in weight on false floors furnished for cars, he advises that this matter has been held open pending the result of further investigation.

These and other matters to which I will not refer to-day have not been taken before the Railway Commission because of the pending eastern rates case.

There was an intimation that one of the express companies contemplated re fusing to accept L. C. L. shipments of fruit in leno covered baskets. Upon investigation we found the order was enforced at one point only, and was brought about by a shipper making claim for loss on shipments of this character. The incident, however, brings up a problem which the fruit growers and the express companies must face in the near future. The leno covered package is rapidly growing in public favor, and smaller markets will soon be demanding them. Many such markets will probably never be large enough to permit of carload shipments, and it will, therefore, be necessary for the express companies to devise some methods of equipping express cars on regular trains running through some of the fruit sections with collapsible racking in order to carry this package with any satisfaction. This is a matter upon which I would like to hear some discussion. The question of increased rates for leno covered baskets in L. C. L. lots will undoubtedly be brought up before very long, especially if express cars have to be racked, and I would be pleased to know the feeling of the meeting in this regard. During the past two years there has been a desire on the part of the express companies to refuse delivery of this package because of its delicate nature when loaded along with other express, but it was pointed out to company officials that the traffic was not very heavy and we would undertake to discourage L. C. L. shipments as much as possible. I believe, however, the time has about come when some permanent steps will have to be taken.

The outlet from Ontario into the western market by the opening up of the Cochrane route, giving a fifth morning delivery, and in some cases four days, will undoubtedly improve conditions in many ways. There will, for instance, be less tie-up of cars at terminals, and this will result in more prompt delivery of cars to the shippers. We cannot help but appreciate anything and everything that tends to develop transportation facilities be it ever so small, because the greatest drawback to-day to the fruit industry is the want of proper facilities and a quick service for getting into the distant markets. It is true the great wave now sweeping throughout Ontario in favor of public ownership in transportation is an important factor in solving some of the marketing problems of the fruit producer. It would be a great advantage for local marketing, but with the present rapid development of the industry we cannot afford to be tied to the local markets, and, therefore, must continue to press our demands for transportation service that will permit us to reach out for business.

In some of the newer fruit districts shippers have recently made request for a low rate on small quantities of various fruit being assembled at central points for re-shipment in carloads. The request is a just one and unless our appeal to the Railway Board for the one-third rebate on such shipments is decided in the near future, I am of opinion we should appeal for a concentration rate. Under such a tariff certain varieties of fruit, for instance early varieties of apples could be marketed much more profitably, because carload shipments could be collected where at present the apples never reach a market because of wagon hauls making it unprofitable both from cost of delivery and damage to the fruit. I have in mind two or three sections of Ontario where these circumstances exist. The average haul is 9.6 miles. Comparing this with a report from 114 fruit producing counties of the United States under similar conditions, for which statistics have been collected, it would cost $2.79 per load of 2,300 lbs. or 12 cts. per 100 lbs. for apples; $3.53 per load of 2,181 lbs. of fruit other than apples, or 16 cts. per 100 lbs. to make wagon delivery to the shipping point.

Niagara Peninsula shippers will remember the serious losses sustained early in July of 1914, through delays and the supplying of improper cars for Montreal shipments via Canadian Express. The past season an effort was made to co-operate with this company by undertaking to supply them with specific data relative to quantity of shipments and probable dates for the early part of the season, particularly at certain points, to avoid if possible a recurrence of the experiences of 1914. Our efforts, however, were unsuccessful because of the actions of a certain under-official well known to the shippers of that district. It was the only instance during the past three years where our efforts to improve service were indifferently dealt with. Every other official of every other company was always ready to hear our suggestions and sought such statistical information as we were able to provide because it was in their interests to do so. We want express service—that is what you pay a high rate for. The express company wants the traffic, therefore, anything that tends to improve conditions, benefits both, and the official that cannot be big and broad enough to measure up to a mutual co-operative plan is not a valuable asset to any company. It is not so much a question of rates with the fruit growers as it is service, and we should at least have such rights and privileges as the Railway Act allows.

Railroad regulation and supervision by commission have come to stay; there can be no question of that fact. A corollary, however, of control and supervision should be protection, so that we must not be unreasonable in our demands. Let our requests be not only in the public interest, but also a matter of justice to the carriers.

Although shipping conditions via water routes have improved under our agitation to have navigation companies placed under the juridiction of the Railway Commission, I still urge the support of that measure by every fruit shipper. Let me remind you that since Confederation public funds equal to $43 per capita has been spent in construction and maintenance of the water routes in Canada. The annual expenditure for improvements of harbors, rivers and canals is increasing year by year, and the charges are being silently borne by the people. The Government has a large fleet of dredges, ice breakers and tugs continually employed in assisting navigation. Our rivers are buoyed and lighted, wireless telegraphy and many other aids to navigation are maintained and operated by the people of Canada—practically all of which are free to the vessel men, and for which they are not compelled to make any sacrifice. Is it unjust or unfair to ask then that the public be surrounded by some safeguards in return for these many privileges? Is it too much for the people to ask some assurance be given them that their interests will be protected? As fruit shippers we are concerned because out of the 52,000,000 tons of freight passing through the various canals last year the products of agriculture supplied over 8,000,000 tons which was only exceeded by the products of mines. Vesselmen claim that parliament should not surround them with restrictions of any kind, but because of such conditions it is a well known fact that Ontario fruit growers have lost good markets in favor of foreign competitors.

A re-adjustment of carload express rates to branch lines in Alberta, Saskatchewan and Manitoba is desirable, as the bulk of the business to-day is on the branch lines.

A stop-in-transit privilege for unloading in the western market has been advocated, and is worthy of consideration.

There are other suggestions—many in fact—that might be mentioned and which if applied would no doubt widen the field of distribution. All that I can say, however, is to get together, and stand together in your demands. Keep records of your shipments and be able to supply these records when occasion demands for just as sure as marketing in sharp competition with each other means disaster to the fruit industry, just as certain will neglect of the transportation problems spell ruin to this important branch of agriculture.

Ontario fruit producers cannot afford to allow either to exist any more than the North Pacific Distributors, the California Fruit Exchange, and several other large organizations that saved the situation for the growers by co-operative methods. You represent too grand and great an enterprise to permit any such calamity, and the sooner the carriers and the growers realize this the better it will be for all. Think of it—by placing a valuation of $200 per acre for an apple orchard; $300 for peach, pear, plum and cherry, $350 for small fruits and $350 for grapes, and you represent an Ontario industry with an approximate capitalization of about $100,000,000. Twenty per cent. is said to be a fair average return. Therefore, this industry can perhaps safely be estimated to carry on an annual $20,000,000 business. These figures may not be absolutely correct, but they are nearly so, and will serve to illustrate just why, as fruit growers, you are deeply concerned in the question of transportation.

When a dealer who holds the fruit but a few days passes it out over the counter at a profit in excess of the man who plants, cultivates, prunes, sprays, harvests the crop and maintains his skill and vigilance through years of toil; and when the transportation company receives 15c. more for carrying a barrel of apples 146 miles, than the grower does for the fruit, it is evident there is something wrong with the transportation and marketing systems.

In carrying on my work I have been impressed with the need of better selling methods for the fruit industry, more efficient organization, whereby the principles of co-operation will be more thoroughly applied in marketing, and in reducing production costs. Organizations of this kind in the United States are far in advance of those in Canada, while Ontario fruit growers in particular are making slow growth with regard to efficiency along these lines. I do not make this reference in the spirit of criticism, but simply to point out that while such conditions continue to exist and the fault lies with the individual growers—it is going to be some time before the full strength of the fruit industry of this Province will be felt by those who are to-day profiting by these conditions. Co-operative methods will span the gulf that now exists between the producer and the consumer. It will obtain the best possible transportation service, regulate distribution, and forever dispel the danger of over-production.

THE CHAIRMAN: Have the railway companies a right to make a new tariff without notice?

A.—The railway can make a new tariff and file it with the Railway Commission, and unless there is an objection it goes into effect.

MR. HODGETTS: Did you get notice of that change?

A.—No, this is a new tariff, it is not a new classification.

THE CHAIRMAN: Is there not some way by which we can get notice of these changes so that we can have time to consider them?

A.—I have been striving to do that, and I have only succeeded as to classification. I am in hopes that in the near future all tariffs will be filed with the Fruit Growers' Association.

Q.—What is the reason for the change?

A.—I presume the reason is that the railways have asked for an increase in freight rates, and it does not look as though they are going to grant the increase.

But this proposed increase in charge on refrigerator cars will meet about half of the proposed increase in freight rates. The thing to decide is, is it a fair request? If you get an iced car you have to pay for the ice. If you get a heated car should you pay for the heat?

Q.—Is that a fair price for the heat?

A.—That is the question that you will have to decide. The cost of the heater should not enter into the question, because they are returned. I do not suppose the cost of the heater would be over $15.

The Chairman: I think it would be well to appoint a committee to take into consideration this question and report later.

Moved by Mr. Clement and seconded by Mr. Fry, that the President select four members to act with him on a committee to consider the proposed charges for heated cars. Carried.

A. W. Peart: I have recently read that investigations have been made in the United States as to the amount of money that goes into the producers' hands as compared with the amount of money paid by the consumer. Taking the general run of farm products the result of the investigation goes to show that the producer gets 45 per cent., leaving 55 per cent. going to the various agencies. That is a most important question. I think proposed changes in the freight tariffs should be presented before the Fruit Growers' Association.

Mr. McIntosh: May I suggest that the matter should be referred to your transportation committee.

Mr. Fitzpatrick: Do the fruit growers get 45c. on the dollar?

Mr. Peart: I am speaking of the gross amount, not the net amount. Sometimes the net would be nil.

Mr. Fitzpatrick: From my experience as a fruit grower and a farmer I do not think the fruit growers get as large percentage as the general farmer.

Mr. Foster: Are there some other things in this report that should be discussed here? We tried to get some better accommodation, and Mr. McIntosh tried his best to help us, and I have hopes that we will yet get it. Our experience at Burlington is that we have had fair accommodation from the express companies; the only thing we lack is a little better supervision by the local agent. We are lacking in the careful handling of the fruit from the platform to the car.

Mr. McIntosh: The local agent is supposed to see that the fruit is properly handled. Is it fair to ask express companies to carry leno covered baskets in L. C. L. shipments at the same rate as baskets.

Mr. Robertson: Have they been doing that?

Mr. McIntosh: Yes, the same rate per 100 lbs. Do you think it is fair that they should carry that awkward package at the same rate?

Mr. Edwin Smith: We have to put up with these packages at the Grimsby pre-cooling plant, and we hate the sight of them because we know we cannot handle them properly, or to the same advantage as we can the covered basket. I do not think it is fair to ask the express companies to handle them for the same price as the ordinary basket. I do not like to encourage the leno basket in L. C. L. shipments. I think the fruit should go to the consumer without injury and without loss.

Mr. Robertson: I fail to see the package that carries the fruit through the express companies without loss or injury. We ship by both Canadian and Dominion Express and the Dominion is handled by the Canadian as far as Hamilton. Unless we route them by the Dominion the Canadian will handle the fruit as far as they go, and then hand them over to the Dominion or the Canadian Northern, making two charges when they might go right through by the Dominion. One shipment was to Parry Sound.

W. G. HORNE: Has the Canadian Express Company the right to refuse to accept leno covered baskets. The agent at Clarkson positively refused to accept them on account of a claim that was made for injury. They were accepted at Lorne Park Station the same day.

MR. MCINTOSH: That was the case to which I was referring in my report. I think the express company would be justified in refusing to accept any package that was not properly packed. There is a feeling on the part of express company officials that something should be done with regard to that package.

MR. HUBERT: I do not believe any company can carry that package as cheaply as another. If the price we are paying for leno packages is right, then we are paying too much for the other.

MR. FOSTER: A man at Grimsby has made a cover which can be placed on the top of the leno basket and they can be shipped seven or eight high from here to Montreal without injury. I am not selling the cover, but it was tried out this summer.

W. G. HORNE: We shipped from Lorne Park and nothing was said, but they refused them at Clarkson.

REPORT OF THE HISTORICAL COMMITTEE, 1915.

A. W. PEART, BURLINGTON, AND W. T. MACOUN, OTTAWA.

Owing to the report of last year being the first of the kind presented to the Association, it was, in consequence, somewhat comprehensive and discoursive, in endeavoring to trace several of the leading events in the growth of the Society and the development of the fruit industry of Ontario.

This report will take up other events not yet recorded, leaving others again for a future occasion.

In 1904-05 several of the local co-operative Societies united in a central organization known as the Co-operative Fruit Growers of Ontario. It marked a distinct advance in the co-operative principle, its chief work being to furnish supplies and act as a bureau of information to its members.

Later on in 1913 the same spirit of intensive co-operation led to the formation of the Central Selling Association.

As local co-operation was a great step forward in the interests of the grower, so has been the amalgamation of the various bodies into one selling organization. The various local units are able to dispose of their apples to better advantage through the central, since the latter has wider facilities to keep in touch with the markets everywhere and is able to fill an order promptly with the varieties in the quantity and quality desired. The consumers and dealers also know where to place an order with the assurance that if there are apples it will be filled. In 1913 there were thirteen affiliated societies and in 1915 three more in addition. For a small fee it also sells apples for the private or independent shipper.

At various points in the Province since the year 1909 the Department of Agriculture of the Ontario Government has started demonstration orchards. They take an ordinary apple orchard of bearing age and sometimes a neglected one, and give it good care with the idea of making it an object lesson to a locality as to the possibilities of an orchard.

To the uninitiated the returns from a well kept orchard when the product is sold intelligently, seem large. If, however, it costs a dollar per barrel to put the apples on the trees ready for picking, and another dollar to get them off and load them in the car, it is quite clear that over a term of say five years the profits will not be unduly heavy.

The "Fruit Marks Act," now known as the "Inspection and Sales Act," was passed by the Dominion Government in 1901. Since then from time to time it has been amended as experience would appear to warrant. For many years apple growers and shippers felt that if they required to grade and pack according to the Act there should be some official recognition of such, as in the inspection of wheat. At the Dominion Fruit Conference at Grimsby in 1914 the matter was fully discussed—the outcome being that certificates are issued by inspectors at points of shipping when desired, showing the result of the inspection so far as it had gone. This is an advantage, since it helps to protect the shipper later on in case of dispute.

On February 10th, 1911, fruit growers of Western Ontario and the Niagara Peninsula to the number of about 800, went to Ottawa and entered a strong protest before the Government of the day, in the House of Commons, against the proposed free listing of staple fruits between Canada and the United States. In the subsequent general election the protest was ratified.

The Vineland Experimental Station was started in 1907, the property being donated to the Ontario Government by the late M. F. Rittenhouse, of Chicago. Located in the heart of southern Ontario it has a distinct field of usefulness, and as the years go around it will, no doubt, evolve new varieties of fruits and vegetables of practical merit, as well as ideas of care and culture valuable to the horticulturist.

Notwithstanding the war the fruit grower has done fairly well with his product during the past year. Apples were scarce and in many districts the quality was poor owing to climatic conditions and excessive moisture, which encouraged the growth of scab. Good apples sold at fair prices and even those of indifferent quality found a ready market. Most of the crop was consumed in Canada. This is one of the signs of the times. Canadians are beginning to appreciate the fact that home grown apples are as good or better than those imported from foreign countries. The axiom, that the farther north a product can be successfully matured the better the quality, holds good of the apple.

In 1905 Prof. Reynolds of the Ontario Agricultural College, Guelph, sent two car loads of tender fruits to our Canadian Northwest. This was followed up in the next year by the St. Catharines Cold Storage and Forwarding Company. These pioneer shipments have opened the way for an increasingly valuable trade in tender fruits with the Prairie Provinces, which is rapidly growing year by year.

THE LATE DR. WM. SAUNDERS—HIS WORK IN HORTICULTURE.

Dr. William Saunders, C.M.G., who died at London, Ont., on September 13, 1914, in his 79th year, was born in Devonshire, England, in 1836, coming to Canada, with his parents, at the age of twelve years. The family settled at London, and there he lived until he went to Ottawa in 1887 to become Director of the Dominion Experimental Farms, which position he held with marked ability until 1911, when failing health obliged him to give up his work. He spent about a year abroad, and then went back to London where he resided until his death.

Dr. Saunders was keenly interested in many things, but we believe that in horticulture he had his greatest delight during the past thirty-five or forty years. As a diversion from the confining occupation of a chemist, he, when a young man, sought the pleasures and benefits that the culture of fruits and flowers bring to those that love them. As early as 1868 he began to plant a fruit farm near London, Ont., and a committee of the Ontario Fruit Growers' Association visiting this farm in 1873 have, in their report, the following words: "The fruit farm of Mr. Saunders in the immediate vicinity of London is the most extensive in the western portion of the Province of Ontario. It consists of a hundred acres under the closest fruit culture." When the large fruit farm was just beginning to produce a considerable crop of the tree fruits, the management of it became burdensome, and Dr. Saunders, therefore, sold this farm and purchased a much smaller place nearer to the city, where, without any thought of making it profitable financially, he could continue to cultivate fruits and flowers in great variety. It was on this smaller farm, especially, that he collected ornamental trees and shrubs in great variety, and obtained a knowledge of them and their culture shown by him in later years, and enabling him to intelligently supervise the work in horticulture at the Dominion Experimental Farms. The desire to originate new, and if possible, better varieties, was very strong in him. He was one of the earliest hybridizers in Canada. He believed that the best way to obtain new varieties of merit was by combining the good qualities of two in one. In 1872 he read a paper before the Ontario Fruit Growers' Association on "Experiments in Hybridizing," in which he described the methods adopted by him and the results of his work between 1868 and 1872. "For five years," he states, "I have been working more or less in this interesting field, and have experienced some successes and many failures. Beginning in 1868 he made crosses with the gooseberry, grape, raspberry and pear, during the next five years. It takes a long time to originate, thoroughly test, propagate and introduce a new variety, and while Dr. Saunders did not live to see all his best things in the hands of the nurserymen, he had the satisfaction of knowing that at least some were well and favorably known. Of his earlier work, the Pearl and Red Jacket (Josselyn) gooseberries have won for themselves a good reputation among fruit growers. His Saunders' black currant, though in the trade for a number of years, is not so well known. His Eclipse, Magnus, Clipper, Climax, Eagle, Kerry, Success and Beauty black currants, all excellent varieties, are available to anyone who desires to grow them. His work with raspberries was mostly confined to the crossing of the red with the black cap. Many of these crosses, while heavy croppers, were not attractive in color, and while excellent for home use, did not appeal to the trade because of their dark color. The Sarah is one of the best of these, and is a most excellent variety for home use, and being late, it lengthens the raspberry season. Two other early red varieties are Brighton and Count, which are very hardy and productive, the former especially being a very heavy yielding early sort. None of his grapes are offered for sale, but his Emerald, a white grape, is one of the highest quality and excellent for home use, and his Kensington is a fine white variety. At the Colonial Exhibition in 1886, the Emerald grape was considered the best of the Canadian sorts exhibited.

While Director of the Experimental Farms, his enthusiasm for the production of new things did not become less, and the many hours of hard work spent in his garden at the Central Farm are known only to a few who were intimately associated with him. His work with gooseberries, currants, and raspberries was continued there. There he crossed the gooseberry with the black currant producing a very interesting but sterile hybrid. Some work was also done with plums. Among ornamental plants he was especially interested in roses, and his Mary Arnott and Agnes roses, two fine varieties, are the results of his efforts. He originated some very interesting and ornamental hybrids, between the Thunberg's and Purple-leaved barberries which are at present under test at Ottawa.

His most important work in hybridization has been left to the last. Visiting the prairie provinces frequently as he did, he saw the need of hardy apples there, and the success of the wild Siberian crab apple (Pyrus baccata), at Indian Head, Sask., gave him the hardy material with which to work. This little crab apple, smaller than a good cherry, from one half to three-quarters of an inch in diameter, was used as the female parent of many crosses with hardy Russian and American apples of good size as the male. This work was begun in 1894 and continued in succeeding years. The first fruit was produced in 1899, when thirty-six trees bore, and five of these were of such size and quality as to justify their being propagated for more general test. In time about 800 trees were set out, a large proportion of which fruited. The largest of these first generation crosses were from one and one-quarter to one and three-quarters inches in diameter, a substantial gain in size over the mother parent. As rapidly as possible the best were sent out for test and some of these have proved very hardy, fruiting abundantly on the open prairie without protection. Among these may be mentioned the Jewel, Charles, Silvia, Prince, Tony, Robin and Elsa. So hardy are these that fruit of these crosses has been produced at the sub-station at Fort Vermilion in latitude 58, where the temperature frequently falls to between 50 degrees and 60 degrees Fhr. below zero.

Not content with hardy apples of so small a size, Dr. Saunders re-crossed the best of these first crosses with apples of larger size, in 1904, and from this work over 400 trees were obtained. Many of these have now fruited, some of which have produced apples two and one-half inches in diameter, and of good quality, which are being propagated and sent to the prairie farms for test. It is expected that some of these will prove quite hardy in places where apples of this size cannot at present be successfully grown. Even should they not prove sufficiently valuable to satisfy the settlers who would like to have apples equal to any grown elsewhere in Canada, Dr. Saunders has, at least laid the foundation of a hardy race of apples from which no doubt will eventually come varieties even better than those available at present.

The love of the beautiful in nature was very strong in Dr. Saunders, and he was able to give expression to this love in his work in beautifying the Central and Branch farms. Many countries, many botanic gardens, nurseries and seed catalogues were searched for plants and seed to test, in order to learn their value under Canadian conditions. Beginning in 1887 and continuing until 1911 he continuously endeavored to bring to Canadians from other countries, all that was best and most beautiful among trees and shrubs and flowers, and from the abundant material available, he was able to plan and plant the grounds at the Central Farm especially, in such a way that it is to-day, one of the most beautiful places in America.

Comparatively few knew of the work Dr. Saunders did in planning and planting the trees and shrubs along the Government driveway in Ottawa, but it should be recorded here that a large proportion of the driveway between St. Louis Dam and the Rideau River was planned and planted by him.

Canadian horticulturists have lost a warm friend in Dr. Saunders. He was a true amateur horticulturist, the love of the work standing out in everything he did. He was a member of the Ontario Fruit Growers' Association from its early years, and was one of the few enthusiasts who kept the Association in existence before the commercial side of horticulture had developed much in Canada.

ROBERT THOMPSON.

In the sudden death of the late Robert Thompson, of St. Catharines, which occurred on February 9th, 1915, this Association and the public at large, suffered a distinct loss.

For many years Mr. Thompson had been an outstanding figure in the circles in which he moved. Few men during the past two decades have impressed themselves more strongly in connection with the various movements which have had for their objects the uplift of the rural population, not only of this Province but of the Dominion at large. Indeed his sphere of activity was not confined to Canadian soil alone; his services in connection with the organization of co-operative associations have been frequently sought for by our neighbors across the line.

Born in Ballynahinch, County Down, Ireland, Mr. Thompson came to Canada at a very early age. He spent the greater portion of an extremely busy life near St. Catharines in the building up and developing of his splendid fruit farm. His energy, however, led him, while a comparatively young man, to take an active interest in municipal and provincial movements of a public character. He was for many years indefatigable in his efforts for the advancement and progress of the Ontario Fruit Growers' Association, and also of various local organizations, in all of which he has been called to fill the position of presiding officer.

For a considerable period he was connected with the lecture staff of the Farmers' Institute, and in this capacity visited nearly every county in this Province, and many places throughout Canada.

The most outstanding feature of his life, no doubt, was the remarkable success of the co-operative work of the St. Catharines' Cold Storage and Forwarding Company, under his able management for many years.

Cut off suddenly in the prime of life, while mind and body were busily engaged in plans and effort for the well-being of brother fruit growers, Robert Thompson has left a great vacancy in our midst, and a record which should impress many of our younger men with a desire to take up the work when he and others have laid it down, and to press on to even greater achievements.

ALBERT EDWARD KIMMINS.

Little did we dream one year ago that the dreadful European war would be still raging to-day. This cataclysm is no longer confined to Europe, but is drawing in Asia and Africa as well, neither is the American Continent exempt from this world war. Many Americans and Mexicans are enlisting under the *Entente* colors, while Canadians, Australians and New Zealanders by hundreds of thousands are helping the Mother Land in her great hour of need. Canada although not the theatre of actual warfare is at war as a part of the British Empire. 250,000 men have already responded to the call and 250,000 more are on the eve of being enrolled.

Day by day our sons are joining the colors. Patriotism and the red blood of young manhood inspire them to smile at hardships and the risks of war. Many of our own profession have already given their lives. All honor to these brave men. We all hope that in the near future success may crown the efforts of the Allies that peace with honor may be the destiny of the British Empire, and that in the womb of time, the events of the war may be founded into a creation of lasting peace.

"To the Glory of God and in memory of Albert Edward Kimmins, Major, of the 77th Wentworth Regiment, who fell in the second battle of Ypres, April 23rd, 1915, while in discharge of his duties as a soldier of the Empire. As a token of gratitude for his noble life and faithful labours in this Church, this tablet is erected by his friends."

This is the inscription on a brass tablet that it has been considered appropriate to erect in St. John's Church, Winona, as a token of respect to the memory of the late Major Kimmins. The unveiling of this tablet awakens again memories of one whose place it is difficult to fill, and one cannot adequately describe on paper the many sterling qualities which helped to endear him to a host of friends in the Niagara Peninsula. He was one of those bright cheerful men who enjoyed his work, his home, his friends and his chief hobby, music.

Major Kimmins commenced life in Canada at the age of eighteen after being educated in England where he was born at Sittingbourne, Kent, in 1870. Some twenty years ago or more he engaged with Mr. E. D. Smith as assistant and bookkeeper, and by close attention to the duties that devolved upon him, he worked his way upwards, step by step, until he became Senator Smith's right hand support, and, later, general manager of E. D. Smith & Sons extensive business at Winona.

He was passionately fond of music, and his strong tenor voice was the main support of the choir of his own parish church at Winona which he attended so faithfully and regularly. He was, also, an ardent supporter of the Elgar Choir, and his membership in this well-known musical organization dates back, I think, to the time of its original formation. He was a Conservative in politics and a staunch Imperialist, and to further his strong imperialistic ideas, Major Kimmins enlisted at the outset of the war and afterwards laid down his life for the cause he held so dear. He never sought a municipal or political office, but he was a most useful member of the Masonic Order, Foresters, and Sons of England. He was highly honored by his brethren in Masonry, being a Pastmaster in Wentworth Lodge No. 156, A.F. and A.M., Stoney Creek, with which he was united April 27, 1896. He was also a Pastmaster in Union Lodge No. 7, Grimsby, a member of Grimsby Chapter No. 69 and a member of the Scottish Rite, Hamilton. In 1899 he married Miss Helena Bedell, of Winona, who is left with his two daughters, Dorothy and Gertrude, to mourn a father who was just, thoughtful, honorable, and whose influence will always be a lasting one in the community.

BERRY CRATES AND CONTAINERS.

J. B. Fairbairn, Beamsville.

Possibly the remarks which I will make will be of more interest to men living between Hamilton and St. Catharines, than to those of you who live between here and Hamilton. At present the output is handled in three different packages. For the most part the individual boxes that are used are four-fifths of a quart. To a limited extent we use a box half that size.

In containers we are using a 24-quart crate, a 27-basket crate and a 36-basket crate.

I want to give you, this afternoon, the result of personal observation of the 27 basket crate and the 36 basket crate. I do not think it is necessary to enter into any discussion as to the four-fifths box. I doubt very much whether we could improve upon that size. The jam manufacturers or the canning factory might prefer that we should use the American box, but I do not think there would be any advantage to the grower.

Q.—Have you had any experience with the raised bottom box?

A.—Very little in this Province. The raised bottom box is a British Columbia box and is used in the West almost exclusively. We had some of our four-fifths and two-fifths boxes on exhibition at Toronto in comparison with the American box. The American box holds perhaps two and a half ounces more. Personally, I prefer our box to the British Columbia box. In this crate we have an intersection with a depth which corresponds to the false bottom in the British Columbia box. This has been made to avoid the difficulty of shipping fruit and having it arrive in a crushed condition, or having the appearance of not being properly filled, and the fruit being below the top of the box. This intersection permits the grower to fill his box bumper full, and then in transit it will not settle down sufficiently to appear to be below the top of the box and will not have a crushed or mussy appearance. In some shipments made the past season if you tipped the contents to one side you could almost see the bottom of the box.

Mr. Bunting: An effort has been made to introduce the square box in our section. Do you know the disadvantages of that box?

A.—I presume there would be more or less disadvantage in handling these boxes, they would not nest; I am not sure as to how they are handled in British Columbia. Perhaps we can get some information on that subject.

Mr. R. M. Winslow, British Columbia: The British Columbia boxes are all straight up and down and have false bottoms. One of the principal advantages of the false bottom is the fact of ventilation which it affords in the crate. Another advantage is that the fruit on the top of the lower box fits into the false bottom of the box above and they carry much better.

The boxes do not nest. The growers usually buy these crates made up at the mill. They are also bought knocked down. They arrive with one per cent. breakage. Usually the hullocks are bought with the crate made up and filled.

Q.—What per thousand do you pay for the hullocks?

A.—This year the crates filled cost us 17c. in wholesale quantities.

Q.—What sizes?

A.—Any size; two-fifths or pints.

Mr. Fairbairn: The big advantage of this box is its nesting ability. I think we achieve the same advantage of ventilation by this intersection which gives us a half inch between the different layers of fruit.

Q.—What is the added cost of putting in these intersections with the added space between the boxes?

A.—There is no added cost. I have gone into that question with the people who make the crate, and they say they will still make them for practically the same price. The crate is a little bit larger and I expected there would be an increased price.

Q.—Unless you have more skilled handlers of the crates there is danger of the boxes loosening up and the fruit coming against the cover. If that crate is tipped up in carrying it into the cars the fruit will be disturbed?

A.—Where can it go? If the boxes fit tight the fruit cannot shift. I think three pieces on the side of the box would be much better than the two as at present, and I think that would overcome any difficulty of spilling.

Mr. Bunting: Why could not the bottom board be raised up.

A.—I would prefer to have three pieces and have them about the depth of the lower piece in this box.

Q.—If the boxes are well filled they will not be disturbed.

A.—These crates are sold in the flat and the growers put them together. If they are properly put together there will not be any difficulty. Now as to the advantage of this cover over the 24-basket crate cover: As you know the 24-basket crate cover is thin veneer, and is nailed to the basket. In order to examine the contents of the crate it is necessary to remove the nails. If you do not do that the cover will split and has a poor appearance if it is examined by many people. This cover is easily removed and the whole contents of the nine baskets is visible. This cover is fastened with a cleat. One hundred persons can examine the contents without destroying the appearance of the crate. That is one of the main advantages of this 27-box crate over the 24-box crate—that the contents may be examined without destroying the appearance of the crate. This 27-box crate is made of quarter-inch material all the way through, and the 24-box crate is made of veneer, except for the centre part of the bottom piece, which is usually quarter inch material. This box can be put on its end and will stand quite a weight before it will spring. I have seen one of the sides of a 24-basket crate knocked against the side of a car door and the result was that the handle broke and the contents of the crate was spilled on the platform. I have not seen anything of that kind happen with the 27-basket crate, because there are no handles and it is carried in a more careful manner. Most of the buyers in Toronto prefer the 27-basket crate, and they will tell you that this basket will bring 25c. more than the 24-basket crate. I watched the people who do the buying at Toronto this summer, and on the 25th day of June there were only 121 24-basket crates on the Toronto market, and there were between 450 and 500 of these 27-basket crates, and 60 or 70 36-basket crates. There were 15 24-basket crates shipped from my own station by the co-operative company there, and they stayed on the market all that day and part of the next day. I never saw anyone examine the contents of these 15 crates, and I wondered what the trouble was. I asked the man in charge and he told me that the people were looking for the 27-basket crates.

Mr. Rittenhouse: How did the fruit compare?

A.—These 15 crates were not opened. There were some 24 crates that White and Company had from Anderson. They had been opened up and they stood alongside of 27 basket crates. I asked them specially to open six crates of each kind and leave them there for my benefit. I wanted to see which would sell first. I came back in less than an hour and the 27's were gone and the 24's all there. I said, "Have you been quoting these at exactly the same price?" and he said "Yes." On this particular day nearly every 27-basket crate sold for 14c., and not a single 24-basket crate sold for that price; they were being sold for 13c. I was told that the majority of the 24's sold for 11c.

Mr. Carpenter: Did the dealers ask for the 24 or the 27-basket crates, in the smaller towns?

A.—I do not know whether they will ask for the 27 or 24-basket crate. The 27's are almost exclusively in use between here and Hamilton. It is probably re-shipped from Toronto by the commission men.

Mr. Carpenter: I find that the outside people ask for the 24 and not the

27-basket crate. They carry better and the express men handle them better. In the city of Toronto there is only one handling.

Q.—Do you think that the 27-basket crate is stronger built than the 24?

A.—I don't think it is stronger built, but I think it will carry better.

Q.—Do you think they are handled any better by the express men?

A.—No, I don't think so, but the express man gets them up, and he does not have to throw them any further than possible. There is no doubt this crate would be dropped further by the express man than the crate with the handle, but I have seen so many handles broken and the fruit destroyed by the boxes being knocked against the car doors.

Q.—Don't you think he will knock the 27-basket crate against the door?

A.—I don't think he does to the same extent. If he knocks this against the door he gets the jolt himself. He is only carrying one at a time.

Q.—What is the 27-basket crate worth?

Mr. Hodgetts: The Clarkson Fruit Growers' Association paid 12c. for the 27-basket crates made up and delivered.

Mr. Horne: During the strawberry season Clarkson ships as heavy as any other point. They would not think of using the 24 crate any more.

Mr. Carpenter: If I were shipping to Toronto and Montreal I would not use the 24, but if I were shipping to small towns I would use the 24 exclusively. I find the further you ship the 27 the worse it arrives, that has been my experience for five years. Don't you think the 32-box crate that is shipped here from South Carolina is better than any of the others. They ship in both 32 and 36-box crates.

Mr. Fairbairn: For juicy fruits like ours I think the 36-box crate is too heavy.

Mr. Carpenter: In transhipping the 32 and 36 are handled better. They are enough for one man to lift and they do not throw them around.

The Chairman: It would be interesting to know the number of growers who have been using the 24 and the 27 the past season.

The showing of hands indicated that the 27 is preferred.

Mr. Winslow: We use the two-fifths quart for raspberries, in Washington they use the full pint. For strawberries we use the four-fifths and the Americans use the full pint.

You may be interested in knowing that the veneer crate is gradually displacing the sawn crate. The veneer crate is carrying in excellent shape.

E. D. Smith: I want to call attention to the loading of crates in car load shipments. If the production of strawberries and raspberries is going to increase they will have to be shipped in car load lots. The handling of the 24-basket crate is a very great disadvantage. It is impossible to get a good firm load, you can load better with a crate that sets solidly.

ECONOMY CRATES FOR APPLES.

J. W. Clark, Cainsville.

I have been using this crate during the past season, and I believe it is the first time it has been used in Ontario. They possibly would not have been used this year were it not for the condition of the crop. The old form of putting apples in barrels and marking them No. 3 has had the effect of putting down the price.

I believe this package has been used in British Columbia. This year I put up over a thousand of these packages, and I have made some improvement on the first lot that was shipped to us from the makers. I went to Brantford and had them cut out a crate similar to the one I have here. This crate only costs us a half cent more than the crates we received from Toronto, and it is much better. The crate we received first had no cleats on the top. It had only one hand hold and that was on the top side of the box, so that when we faced our boxes for shipment there was no hand hold to turn them over and the buyer would only open the tail end because the hand hold was there. I had the new boxes made with two hand holds. The cleat on the end is a great improvement. With the cleat on the top the ends have a chance to bulge and the weight is taken off the apples. The first boxes we received had three pieces and the apples would get against the edges and become cut.

Q.—Do you face all the apples?

A.—No, only the first tier. We are considering this crate from three standpoints, the producer, the consumer and the dealer. From the producer's standpoint I consider it the coming package; in the first place we like to get the boxes on hand early in the season so as to be sure that we will have sufficient. You can put about nine of these crates in the same space that a barrel would occupy. They are easier to handle, a man can carry three of these in each hand, that would be equal to two barrels. You can put more on a wagon. If you have them out in the orchard and it comes on a rain you will not have barrel heads bursting on you. You can stack a number of these together and it will only take little material to cover them from the rain. Then again, they admit air to the apples. If apples are kept in a close package we know that the ink spots will increase in size.

Q.—What is the cubic capacity of that box, and the weight when filled with apples?

A.—Filled they average 45 lbs.

Q.—Will it hold a bushel?

A.—It won't hold quite a bushel, although it is called a bushel. It holds 2,213 cubic inches, 13 more cubic inches than the standard apple box. It is 10 x 12 x 18 inside.

Q.—What is the object of changing it from the regular apple box size?

A.—It is a better shape and loads in the cars very neatly. Twenty boxes will go in a row and not leave very much space. I never saw more than two inches of space at the ends. You can put them four tier high and get 560 boxes in a car. A barrel costs from 40 to 47 cts. each and these only cost 11 or 12c. and that makes them much cheaper than the barrel. There are some disadvantages to this crate. I do not think they will stand as much rough handling. I shipped 20 of these crates to Winnipeg, and I received word that they arrived in good shape. I shipped to Toronto and received word that they arrived in first-class condition. They will not roll around like a barrel, but it takes one more man to put up a quantity of apples in these crates than it does in barrels; the same gang that would pack 50 barrels per day would put up 150 of these crates in a day with the assistance of one extra man.

P. J. Carey: Where would you draw the line in crating?

Mr. Clark: There are a number I would mark No. 1 in these crates. The apples that we shipped this year were marked xxx and xx, of course they were apples that would have gone in No. 3 barrels.

Q.—What do the x's mean?

A.—They mean the grade, that is all.

Q.—Would the introduction of this box defeat the object of the Fruit Marks Act?

A.—No, I don't think so. We have many farmers who grow apples who are not experienced packers, and they do not know how to put up No. 1 and No. 2 apples, and often good apples are allowed to go to waste when they might be marketed at a fair price. This is an open package because you can see all around it.

Q.—Why mark them xxx?

A.—Well, I had to put something on.

Q.—If you were shipping one's or two's would you wrap them?

A.—The labor in Ontario is too scarce to wrap them, there might be individuals who could practice that. If I had very choice dessert apples I would wrap them. There is no question but that fall apples would be better in a crate like this than in a box.

Q.—Why not mark them A, B, and C?

A.—What difference does it make. I do not think there is one man out of ten thousand that knows what xxx means.

Q.—Some are still using xxx for No. 1 apples?

A.—Three x's do not represent No. 1. The question is, is this a good package for putting up apples?

Mr. Dewar: I cannot see when the Government has a standard box why some person should jump in and get up another box. If I understand it that box is just got up for the purpose of escaping the Act. It is just the same as with the basket. We had a standard basket, and then somebody got the deep 11, and then somebody else got the shallow 11, and we got to where we were eight years ago.

Mr. Clark: The standard box is too expensive and it is a closed package.

Mr. Dewar: You are trying to avoid the Act.

Father Leopold: Do the inspectors consider that an open package? That rests with the Commissioner.

Mr. Clark: That is the question. Is it an open package? We want to have that discussed. I consider it is an open package because the consumer can see all around, there is no chance for deception. Can we put up apples in this box so that they will keep better than when in barrels? We know that we can supply the consumer with a cheaper apple in this kind of a box.

Q.—Why grow scabby apples?

A.—I do not know what section you come from, but I would like to see any orchard that was absolutely free from scab.

Mr. Depew: You know where I come from and we had no scab.

Mr. Clark: You are an exceptional man. I know that in our section the apples were affected more or less. In the large cities the customers cannot buy a barrel; they have not enough money. Take the ordinary housewife going down town to buy some apples. The dealer might say, "I can sell you a barrel a great deal more cheaply than by the peck." The customer may live on a top flat where it is hard to get a barrel, but one of these boxes can be carried up with ease. If they buy a barrel they have only one kind, and they can buy three different kinds in three boxes for the same money.

Mr. Horne: Are we to understand that they will be shipped the same way as shipping baskets?

A.—Yes. This crate can be used for a lower grade of apples. There is not going to be the same amount of spraying done next year as formerly on account of the low prices, and labor is going to be scarce, and this package will suit the ordinary farmer.

J. F. ELLIOT: I think probably I ship as many apples as most of you. I ship between ten and twenty thousand barrels a year. We have an Act to go by, and I have been trying my best to live up to that Act. Now I do not think we should try and go back on that Act and allow packers to put their apples in any kind of a box. I cannot see why a standard box cannot be carried upstairs just as easily as this crate.

MR. CLARK: The question is whether this box cannot be used for third grade.

Q.—You advocate that box for third grade only?

A.—No; second and third grade.

MR. ELLIOT: There is nothing against the box. Why not mark them No. 3?

A.—We are not trying to put them off as No. 1.

W. H. BUNTING: Some people seem to think this box will supercede the regular apple box. I have handled a few apples in boxes and my contention has always been that the apple box as we have it should not be used for inferior fruit, but should be used only for first-class fruit. Mr. Clark has here a package that he says will be easy to use. If he would advocate it only for second and third grade apples I think it might be useful; and I think perhaps his contention is well founded that we need a package of that kind for the class of fruit we are discussing this afternoon. The boxes should be marked No. 3.

A MEMBER: It should be the same size as the ordinary apple box and then you would have three boxes to the barrel.

THE CHAIRMAN: This box is 10 x 12½ x 18.

MR. DEMPSEY: Ninety per cent. of the apples that grow in Ontario wilt when exposed to the air; how are you going to overcome that?

MR. CLARK: It will have that disadvantage. But they won't wilt in a reasonable time. The same apples would be far better exposed to the air than shut up in a barrel.

MR. DEMPSEY: Put a Russet in that box and it will wilt in two weeks so that it won't be fit to use.

THE CHAIRMAN: Many of us have thought for a good many years that it is folly when apples won't pack about half No. 1 and No. 2 to waste valuable time putting them up in No. 1 and No. 2 and make an inferior grade. This year on account of the scab and ink spot apples put in these boxes would be satisfactory. The edges should be rounded so that the apples won't get cut.

MR. CLARK: With this box we can merely face one end and then dump the apples in and use a racker. I have a racker that is felt lined.

Q.—Do you leave the pad on?

A.—We did leave a few with the pad on. They should be put up fairly tight. For varieties that wilt a paper could be wrapped around the box. We have not had a single complaint from anyone who has got these boxes.

Q.—If you put a paper around the box they would have to tear it to see the apples and that would make it a poor looking package.

A. W. PEART: I rather sympathize with Mr. Clark in his desire to produce a crate for some kind of apples. I would oppose having it a different size from the standard box. It would be very unsatisfactory to ship a car load of apples if the boxes were of different sizes. I would welcome some form for packing the No. 3 apples outside of the barrel. This last year I have used a bushel hamper. They are covered with a round loose cover. I am told by the commission men of

Montreal that that hamper is sold to a great many people. It is called the Housewife's Package. I consider this package of Mr. Clark's an open package, the same as a raspberry crate. I would brand it if I saw fit, or leave the brand off. I do not think the fruit grower should be legislated against too much, and that is one reason why I am backing up Mr. Clark's package, but I think it should be limited to No. 3 grade.

Mr. Winslow: We have been using crates in British Columbia for four years for apples. About one-third of our crop was put up in crates this year. We had eight or nine different sizes, some men put their names on the crates and others did not. We have a very interesting situation out there just now in the matter of these crates. It has far more slants on it than you think. There is no doubt it has come to stay. We save about 12c. on each box. I feel very much that the crate should not be the same size as the apple box; so as to give the No. 1 grade that much distinction. No. 1 needs a good deal of protection, and it must have some distinction. As Mr. Bunting has said, if you make the crate the same size as the apple box you are imitating the apple box to a certain extent.

Q.—Do you brand them out there?

Mr. Winslow: That is a matter of choice. The inside edges of the slats are bull nosed and there is less cutting of the apples.

Q.—Did you have any complaint of wilting?

Mr. Winslow: No. Of course we have doubted as to whether these crates would do for winter apples. There are no crates of apples left in British Columbia at the present time. In the whole of the Western provinces there are only 13,000 crates of apples left in cold storage. The apples are put in crates with the intention that they will get into consumption before Christmas. We put a car load of apples in Toronto and they seemed to be very much appreciated. Our crates cost about the same as the apple box when you get four pieces across the top and bottom and three pieces on each side. The increased number of nails increases the cost. Some brand the boxes and others do not. Some have a grade trade mark. No one puts their name on. The crate is bound to come; we feel it has an advantage over the box. I do not say that it is possible to standardize the crates. When everybody begins to experiment with these boxes you have the real thing.

BASKETS.

F. M. Clement, Vineland Station.

I am asked to say a few words on two subjects—this afternoon on "Baskets," and to-morrow afternoon on the "Grading of Basket Fruits." The subjects are timely and logical; more particularly so because at this time we are discussing markets, marketing and co-operation, and the basis of a good pack for any co-operative society is a uniform pack, uniformly packed with uniform grades. It must be remembered that the basket as we use it to-day is not the product of a day or a year, but has been evolved from home-made boxes, baskets of various sizes and shapes, boxes and other containers that at various times have been used for delivering fruits to the markets. It must be remembered also that the basket is a temporary container being used only for delivery and then discarded or destroyed. The consumer pays for the container with each basket of fruit that he buys. The factor of cost in the basket is essentially then an important one.

Because of the demand for a basket at a low price the tendency has been somewhat to make a cheap basket—cheap material, cheap manufacture, cheap basket. The leading growers, however, demand a good quality basket. The veneer may vary in thickness. Veneer of good quality cut in not more than sixteen to the inch for six quart baskets and not more than fourteen to the inch for eleven quart baskets, makes a fairly substantial package. Material of hard wood of excellent quality may be cut a little thinner; the handles for six quarts should be cut not more than eight to the inch and for eleven quarts not more than seven to the inch. The bands must be strong, of good material and all parts must be well nailed. I shall be pleased to have the opinion of manufacturers on these standards.

At present the sizes of the so-called "six" and "eleven quart" baskets are fixed by law, but it is very difficult to find baskets that are constructed exactly according to the standards. Baskets manufactured by various companies vary so much that much inconvenience is caused in uniform packing, finding covers to fit and loading in the car. It is suggested that when once the size for quantity and the dimensions are fixed by law, the blocks be supplied to the manufacturer by the Government to insure uniformity of manufacture. This is the basis of the packs to be discussed under "Grading of Basket Fruits" to-morrow.

I have mentioned something of the quality of the material to be put in the basket. The quantity the baskets should hold and the shape the baskets shall take are also important. Two sizes of baskets for quantity seem to be very well recognized by all growers, that is, those baskets that are now known as "six" and ordinary "eleven quart." The former is generally accepted, as it now stands for all small fruits including grapes and fancy peaches. With certain requirements of quality in manufacture no change seems advisable. The latter basket, that is, the package that is now known as the eleven quart, has come in for a great deal of criticism. It is claimed that it is too low to take three rows of No. 1 peaches layered, and that with the variation between the size of the bottom and the top fixed by law, it is impossible to pack three layers of uniform size. The smaller peaches must be, of necessity, placed in the bottom if a uniform pack is to be maintained. The law does not permit this, consequently it seems necessary to modify the package or the law. The quantity it holds seems quite satisfactory to both grower and consumer. It is also a very convenient package to handle.

The present law states that a basket shall be a certain length at the top and at the bottom, the difference being two inches. At the same time the law states the baskets shall be a certain width at top and at the bottom, the difference being 1⅛ inches. This permits of much more flare at the ends than at the sides. Why this difference? The strength of the basket is somewhat weakened by the increased slope of the ends which there is apparently no necessity for. It is also this increased length of top over bottom that makes uniform packing most difficult. Some flare is necessary in the basket because of conditions of manufacture and the advisability of "nesting" for shipment and storage.

For packing the fruit the more perpendicular the side the easier and more uniformly the fruit can be packed. The difference in width between top and bottom also permits of air circulations between the baskets so essential in long distance refrigerator shipments. The minimum flare for manufacture is, however, sufficient for a maximum of ventilation in the car.

Generally speaking we are agreed on the more perpendicular side, but the point that seems to be more difficult of decision is how *high* the basket should be. Keeping in mind the fact that this basket is also used for cherries and plums that are somewhat soft sometimes, it seems necessary then to make the height the maximum that will get three layers of No. 1 peaches. The whole situation, then, evolves itself into one of size of No. 1 peaches, and then the minimum height that will accommodate three layers of peaches of this size. The present Government standard for the eleven quart is 5¾ inches deep perpendicular. I am highly in favor of increasing the height of this package one-quarter inch. This will raise the standards of No. 1's. This basket will accommodate three layers of No. 1 peaches and at the same time not make it too deep for the softer fruits. The questions of systems of packing might also be discussed here but I am leaving that for to-morrow.

There is, at present, in use quite largely also a basket known locally as the nine-quart. This is made with the same size of bottom as the common eleven-quart, but the height is the same as that of the six quart. This basket will take two layers of fancy fruit. By law this basket must be stamped with the number of quarts it contains when full before it is a legal package. This package might also be standardized for certain grades of fruit. It takes two layers of fancy peaches exactly. At the same time if this is standardized it should be made a special package for a certain grade of fruit and be protected from the poorer grades.

One other package that was used somewhat this year is the American bushel, which holds forty-five pounds net of fruit or three eleven-quart baskets. The place of this package is difficult to establish. A certain trade will undoubtedly take a large quantity of fruit for canning purposes in this package. At the same time it tends to lessen a great deal the price of the grower. The price is already at a minimum, and if there is any danger of this package cutting into the basket trade, I would not favor it at all.

W. H. BUNTING: Mr. Clement has very carefully avoided giving us his mature judgment. This question of the basket has been a perennial one for a good many years. I think perhaps we are getting closer to a solution than ever before. There are two reasons why the reduction in the flare on the basket has been suggested by Mr. Clement; one is that it will be much easier to pack the same quantity of fruit in the bottom tier as we do in the top, and the fruit will be more uniform in size from top to bottom. Labor in connection with the making of baskets is getting scarce, and it will be necessary to make more baskets by machinery and it is not only difficult but almost impossible to make baskets with a flare by machinery. The present flare on the ends of the eleven-quart basket is two inches; sideways it is one-eighth. It has been suggested that that should be made as near uniform as possible and as small as practicable. There is one reason why the flare cannot be entirely eliminated, and that is that the baskets will not nest if they are made perpendicular. There must be sufficient flare to allow them to nest. If the flare is reduced it will decrease the capacity of the basket and it has been proposed to increase the depth, it is thought possible that a quarter of an inch will be sufficient. The Government standard calls for a depth of 5¾ inches. If the flare is reduced and the depth increased to six inches inside measurement it is believed that will accomplish both results. If the basket is six inches in depth it will contain three layers of peaches. Of course these baskets are used for other fruits, the same difficulty does not apply to plums, but it does apply to apples and pears and tomatoes. At the present time it is somewhat difficult to get three layers of really good number one fruit in an eleven-quart basket. It is thought that if it was made six inches deep it would help out in making it easier to pack three layers of good fruit in an eleven-quart basket. Mr. Clement has referred to the nine-quart basket. There is a feeling that the nine-quart basket should not be used. It is felt that a good many consumers are deceived by that basket, they think they are purchasing a full eleven-quart basket. I think that criticism is not well taken if the present restriction of the Fruit Marks Act is complied with. I do not think the nine-quart basket should be used unless it is so marked.

Q.—The ordinary consumer does not know the proper size of the basket?

A.—Then I would say so much the worse for the consumer. The grower should not be expected to provide for the ignorance of the consumer.

There is not very much controversy as to the six-quart basket. Nevertheless after measuring a number of six-quart baskets that were used in the Niagara District the past season, we do not find one of them that actually comply with the Government standard. While the capacity was practically the same the actual measurement varied considerably. For that reason there is a good deal of trouble in getting covers that will interchange. It is absolutely necessary that some standard should be arrived at and the same form used by every manufacturer.

Mr. Macoun: We pack a quantity of our apples in the eleven-quart basket; in fact all our apples are packed in the eleven-quart basket, and it would be much more convenient for us if the baskets were deeper because as a rule we can only put two rows of apples in the basket. You will notice the basket of Elmer Lick apples on the table. Although it is only a medium size apple the last row of apples comes above the top of the basket. In a great many of our apples we can only put two rows and then it does not look full. I think a deeper basket would be better.

Mr. Sheppard: We should get the size of a basket brought to a climax. We have in our district six different six-quart baskets, each one of them a different size and shape and it is almost impossible to load them properly in a car. Some makers make the baskets as thin as possible, and some of them make them a little smaller. I think they should all be the same size. I think the cover for the basket should be made on the same form so that they will all be alike. I think we should secure legislation regulating the thickness of the veneer from which the baskets and covers and handles are made. It would be a very great advantage if we could have all baskets made from the one form. As far as we are concerned we are perfectly satisfied with the six-quart basket. I think it is all right to use the nine-quart basket so long as the stamp is put on it. I think we cannot do much better than leave the eleven-quart basket alone. (Applause.)

D. Johnson, Fruit Commissioner, Dominion of Canada: I would suggest that you appoint a committee of growers and manufacturers who should get together and try and solve this problem which is before you at the present time. This matter of baskets had been brought to my attention on various occasions, and if it had not been for the war we would have had it adjusted before now. I brought the matter to the attention of the Minister of Agriculture before the last Session, and he assured me that he would be glad to bring the matter before Parliament, but owing to the war it would be impossible to do so. I also brought the question before him a few days ago and he told me that it would be impossible to secure legislation with regard to fruit at this session. It appears that the Government have agreed with the Opposition that they will bring before the House no legislation outside of the war, and if they open the door for one matter it would be open for other matters. However, we should have these things in shape when the proper time comes. We believe the war will be over before very long, and even if it is not over I see no reason why educational steps should not be taken in these matters. This is one of the most contentious matters that we have to deal with. Every fruit grower has his own idea as to how a basket should be made, the result is that some of the baskets are simply useless, the veneer is so thin that they will not hold up in transit. I strongly support the suggestion that has been made by Mr. Clement, who has investigated this matter, that we have some legislation to control the thickness of the veneer, the thickness of the handle and also the number of nails, because no matter how good the material if it is not properly nailed it is useless. I would strongly urge the appointment of a committee because when this matter comes before Parliament I would like to know your views.

Mr. Foster: I endorse what Mr. Johnson has said, I think we should appoint a committee of growers and manufacturers and let them work the matter out to a conclusion. I certainly would not confine it to the Niagara district.

Mr. Johnson: I would suggest that the President and Secretary select the members of this committee, I feel that you will be perfectly safe in their hands; because they know the members who are familiar with these matters. I would also suggest that they report to this convention before the proceedings are concluded. The committee should get to work as soon as possible and be endorsed by the whole association. If we bring in legislation I want to be able to say that we have the Ontario Fruit Growers' Association behind us.

Basket Committee.

The following committee was subsequently appointed by the Convention:

W. T. Glover, Burlington; W. Gardiner, St. Catharines; B. Piott, Stoney Creek; Keenen Woodenware Co., Owen Sound; Leamington Basket Co.; Gull River Lumber Co.; W. H. Bunting, St. Catharines; W. F. W. Fisher, Burlington; F. M. Clement, Vineland Station; Northern Veneer Co., Grimsby; Hewson & Farrell, Grimsby; Merritt Bros., Grimsby; Orillia Basket Co., Orillia; Oakville Basket Co., Oakville; Forest Basket Co.; Arkona Basket Co. (Rivers); A. E. Dewar, Fruitland; G. R. Hastings, Winona; P. J. Carey, Toronto.

APPLES IN BOXES AND BARRELS.

C. W. Baxter, Fruit Branch, Ottawa.

Since the box as a commercial package for apples came into prominence a few years ago, the merits of both it and the barrel have been so often debated that there is little that is new left to be said on the subject, especially with reference to the barrel. The question has often been asked, "Which is the best package for apples, the barrel or the box?" and I think a very good answer to this would be, that there is no one best package, especially after our experience in marketing the crops of 1914 and 1915. I will try to condense a few details bearing on these packages from the point of view of markets.

Apples have been marketed in boxes for a great many years. I shall never forget my introduction to this package. It was in the fall of 1903. The crop that year turned out much larger than was estimated. The result was that the barrel factories could not supply the increased demand and thousands of barrels of apples were frozen in the orchards. After having received all the barrels I contracted for I bought all the barrels I could, these costing all the way from sixty cents to one dollar each, and as a last resort bought two car loads of box shooks.

The only method of packing which we knew at that time was what is now termed, "Faced and Filled." The face being placed in the box in the same manner as in the barrel. No more time was used in packing in that way and no more frills were put on than in packing in barrels. Consequently we did not expect, nor did we receive, any more money for the boxes than we did for the barrels.

But "Box Packing" and the marketing of apples in boxes have been making history very rapidly during the last few years. It is not very long since our instructors were teaching so many different styles of packs, that the average packer in the east was so confused that he despaired of ever being able to pack apples in boxes commercially. This, however, has been overcome, and we have to-day four simple rules, which, if followed, will give us a perfect pack. In fact, experienced packers tell us that nearly all the apples in Eastern Canada can be packed under the three styles, "3-2, 2-2 and 2-1." The methods to determine the style of packs to be used have been simplified, and with good fruit, practice is the only other thing necessary to turn out a box pack equal to the best.

We say "Box Packing" has been making history. Let us review this history briefly. I think there is no doubt that we are indebted to the growers and packers of California and the Pacific Coast States for the inauguration and perfecting of the present methods. Necessity, no doubt, had much to do in bringing this about. The growers in the Pacific Coast States having bought fruit land of high value realized that because of their being situated so far distant from the large markets of the East, and because of the heavy freight charges in placing their fruit on these markets, they must put out a pack that would be superior to and different from the eastern product in order to obtain their fair share of the trade.

The appearance of these neat packages of very fine looking fruit, and the very high prices realized had a very stimulating effect on eastern growers and packers.

It cannot be said that they were quick to adopt the box as a package for apples or have they taken kindly to it yet, but I believe it was in a degree responsible for the improvement in barrel packing and grading which we have seen. I also believe that this has been largely responsible for bringing about apple packing laws in the various states and the federal law of the United States. As the production of apples on the Pacific Coast increased and the eastern product improved in quality and packing, the average price realized for boxes in the eastern markets was not so great. Wider markets were sought and large shipments were made to the Prairies. Two or three years' experience in these markets has revealed the fact that the demand for the higher grades, such as Extra Fancy, Fancy and No. 1's, wrapped and carefully packed, was very limited and that what the majority of the consumers wanted was apples of good quality; but they did not want to pay for frills. The result was that a cheaper package was adopted and this season a large portion of the Pacific crop was marketed in open crates. Whether this is a desirable package or not will likely be discussed later, and it may be a question of individual market requirements, but the point I have been trying to make is, that our experience with apples in boxes properly handled, wrapped and packed, indicates that the demand for these at remunerative prices to the grower has its limitations. I am of the opinion that the future demand for apples in boxes in the eastern markets will be determined largely by the improvements in the methods of grading and packing in barrels.

We ask what are the trade channels through which most of the boxed apples have been sold in the markets, on both sides of the International Boundary from

Saskatchewan and Minnesota east? They are the hotels, the fruit stores, the fruit stands, apartment houses and private homes. The hotels, restaurants and fruit stands use practically nine-tenths of the total. Why do they prefer to pay a higher price for apples in boxes rather than in barrels? Taken in the order named, some of the reasons may be, "that the hotels and restaurants prefer them because the fruit is of uniform size and quality, if they want apples for baking or pastry they can get them uniformly large, if for serving as fresh fruit, uniformly medium or nearly medium size. Caterers have the individual cost of serving the public figured out to a very fine point and uniformity in size helps them to carry this out in practice. Fruit stores and fruit stands prefer them because of the uniform size, color and quality. The fact that the number of apples contained in the package is marked on the outside is considered a decided advantage and aids the dealer in determining whether the apples will be sold at five cents each, two for five cents or three for ten cents. The profits on apples sold in this way range from one hundred per cent. to three hundred per cent., seldom less than one hundred. To increase the consumption of apples by handling greater quantities at smaller profits is never considered. The proportion used by consumers in apartment houses has been limited, in private homes very limited." Has the Ontario and Eastern Canada apple grower been getting his share of this business? We find the answer in the large quantities of apples imported into Eastern Canada annually. Does the Ontario and Eastern Canadian grower grow apples of sufficiently high quality to warrant his going after this trade? The quality is unexcelled. Is this trade worth catering to? I think it is; but if you intend to cater to this class of trade you cannot afford to lose sight of the fact that the commercial standard for apples in boxes has been placed at a very high point and unless this standard is reached and maintained there is no advantage in packing in boxes. The Inspection and Sale Act does not require a higher standard for apples in boxes than it does in barrels, but the standard has been set higher, commercially. Wrapping apples of low grades in paper and putting them in boxes, as some of our eastern growers have done, will never gain this trade. The disappointment to the purchaser is a detriment to the whole industry.

Now, I would not have you think that I do not favor the packing of apples in boxes, far from it, for there is an established trade for these, limited though it may be, and I think that every grower should be in a position to take advantage of this should the opportunity offer.

Barrels.

The barrel we have had with us always in Eastern Canada. I think if eastern apple growers were asked to choose one package only ninety-nine per cent. would choose the barrel. Have we made any improvements in our methods of packing and grading in barrels during the past few years? I think we have; but the progress has been slow. Our apples are given the preference over our competitors to the South of us in the European markets, and on reading the comments of our competitors, as to the reason for this preference, we find that they give considerable credit to our legislation—the Inspection and Sales Act—and if we are to maintain this preference we must improve our methods of packing and grading. Fruit legislation and apple packing laws are live topics in the United States to-day. Apples from the State of Maine have been forging to the front. Virginia, too, has made progress, and during the past year New York State with her ten million barrels, through her apple packing laws, has made rapid progress. In fact, we are told that the growers in that State were able to sell their apples in markets, where, previous to last year they were debarred, because of the unreliable methods of packing and grading. Now, there may not be any cause for alarm; but, as progressive apple growers, you cannot afford to lose sight of what your competitors are doing, you must not only hold the markets you now have, but reach out for wider markets.

In what way can we improve our methods of packing in barrels?

By improved methods of production, spraying, thinning, pruning, etc.

By more careful picking and handling of our apples.

By more careful packing and pressing. Over-pressing is one of our greatest evils in barrel packing.

By more careful grading.

By having fewer low grades and when we have them to put them where they belong, through the evaporator, the cider mill and the vinegar factory. We surely have had our lesson this year in packing cider apples.

Those of us who have visited the prairie markets, especially those of Western Saskatchewan and Alberta, will not have failed to notice the very small proportion of apples offered for sale in barrels, in fact in many towns and some cities we could not find a single barrel of apples. In answer to enquiries as to why these conditions obtained we were told that it was because of the past misdeeds of a few eastern shippers who practised "Bootlegging" or "Stovepiping." Not being satisfied with this answer we made further enquiries and concluded that the reason was largely a question of freight rates.

I am doubtful whether we in the east fully appreciate the value of careful handling. I investigated a case of a violation of the Inspection and Sales Act recently, and found that the apples (Spies) which were reported in violation had been harvested early in October, picked in pails, poured on the floor of the drive house, placed on the sorting table and packed. The result was one-third waste.

In conclusion I would say that the question of packages for apples, like that of all other fruits, is largely a question of markets, and I think every grower should, as far as possible, be in a position to avail himself of any advantage in marketing, by being prepared to pack his fruit in any legal package which that market demands.

Mr. Maycock: The apple question is one in which the western men are very much interested, particularly the package. There seems to be a difference of opinion as to the packing, and what package to use. So far as my experience goes, and it has been for a period of over twenty years, I find that the barrel still takes precedence. I will modify that by saying up to a certain period, for the fall business the barrel is preferred; but for the business after the first of the year we get a larger demand for boxes than barrels. There is a reason for that, there is less shrinkage in the box apples than the barrels after the first of the year. We found during the year that a number of Ontario packers were packing in a crate, and some of them went so far as to stencil the crates xxx. I think there should be a thorough understanding at this meeting as to what you are going to do. If you want to pack apples in open crates as No. 3 then do so; but do not also put them in barrels, because if you do you will make a conflict. If you want a No. 3 apple on the market put them all up in the same way; do not put half of them in barrels and half in boxes. I want to tell you right here that you will have to pack a great deal better apples as No. 3 if you are going to compete in the western market; because the Washington No. 3 is equal to a lot of your No. 1, bear that in mind, both in color and quality.

NEW VARIETIES OF APPLES FROM OTTAWA.

W. T. Macoun. Dominion Horticulturist, Ottawa.

I would like to call attention to a few apples that are before you on the table. As many of you know we are trying at Ottawa to originate apples that will be second to none in the world. The Fameuse and the McIntosh apples, which originated in Canada, are the finest dessert apples in the world. We see no reason why we should not have other dessert apples, covering every season in the year, that will be just as good as the Fameuse and the McIntosh, apples that will be good keepers and suited to every section of Canada. That is one of the things that we are working for. We expect to be dead before some of these apples are grown by fruit growers in Canada, but we are working away in the hope that some day in Canada we will have these apples grown. We want to take the place of most of the market apples that are grown to-day, because I think you will admit that we have not a market apple that is perfect. I want particularly to draw your attention to this apple which is a seedling of the Northern Spy. The Northern Spy is not hardy at Ottawa. We had the Northern Spy top grafted and saved the seed, and we got a very large proportion of apples of good quality, and one of the very best of these is the Elmer, named after your President. I hope all of you who are interested in the consumption of apples will taste one of these excellent apples.

It has been remarkable the large proportion of good apples we have secured. We have over 1,200 new varieties. Of these there have been less than 4 per cent. of crab apples. There has been more than 80 per cent. of apples of marketable size. We have over 100 varieties now out of that 1,200 that we consider so promising that we believe they will be useful in some part of Canada. We are not booming them at all, but we want to draw your attention to what we are trying to do. We expect some day that some of these apples will find their way on the market.

I want to draw your attention to this seedling of the McIntosh. This apple called the Donald. I am not going to say it was called after the Fruit Commissioner, because it was named before he was appointed; but it is one of the most productive seedlings we have, and I think it will be very valuable in cold parts of Canada. It is early to mid-winter keeper, and the Elmer is a late keeping apple.

Q.—Are they freer from the scab than the Spy?

A.—We are so little troubled with the scab in our orchard that I cannot say. We have been spraying for twenty-three years and we have very little trouble. Here is a crab apple that I called the Rondo. I believe there will be good money in growing them for Christmas decorations. It has a very strong stem and a bright color.

I just wanted to call your attention to these new varieties and to particularly call your attention to the Elmer apple.

WHY ARE NOT MORE SWEET CHERRIES GROWN?

S. H. Rittenhouse, Jordan Station.

I do not propose to answer the question, but I may be able to tell you something about the difficulty we have in growing sweet cherries. The reason there are not more sweet cherries grown is because of the difficulties attending the production of fine sweet cherries. The first difficulty that we meet with is the transplanting of the sweet cherry from the nursery row to the orchard. I need not tell you that is a very difficult matter. It has almost an entire absence of fibrous roots and these roots are very necessary in order to get a catch when transplanting. The next difficulty is that it is very partial to the kind of soil in which it will succeed. The acreage in the Niagara district is very small in which the sweet cherry will thrive. The next difficulty is the time it takes to come into profitable bearing. The next is insect pests and fungus diseases. The cherry is no worse than many other fruits. Another difficulty is the limited market. If it was as largely grown as some of our other fruits the market would be completely swamped.

In reference to diseases the very worst is the brown rot. We may do everything possible and bring the crop to the day it is ready to be picked, and then lose the crop in twenty-four hours through weather conditions that we have not yet learned to combat. The sweet cherry requires a well drained soil, fairly deep. It has been said that sweet cherries will thrive on any soil that peaches will do well on, but I do not agree with that. I think I can count on the fingers of my left hand the successful sweet cherry orchards in the Niagara district. Unless you can plant early in the spring you might just as well not plant at all. We have tried fall planting and have succeeded to some extent.

Mr. Patterson: Won't sweet cherries do on the same soil that peaches will?

A.—I would not like to say that. It is necessary that you select a location that is very late. The sweet cherry is the first tree to bloom after the apricot, and for that reason you will suffer from late frosts. Our orchard is located right on the bank of the lake and has good drainage and that helps in avoiding late frosts.

WHAT PROSPECTS HAVE THE TENDER FRUIT GROWERS FOR DISPOSING OF MORE OF THEIR LOW GRADE FRUIT IN THE FORM OF BY-PRODUCTS?

P. E. Culverhouse. Vineland Station.

This convention affords me a splendid opportunity for discussing an important part of my work as carried on at the Horticultural Experiment Station, Vineland. Though my appointment as investigator in by-products dates back only six months I have formed some ideas which will be presented to you. Your criticism will be of great help to me as you only can give me the growers' point of view.

The question is asked: "What prospects have the tender fruit growers for disposing of *more* of their *low grade* fruit in the form of *by-products?*

Grapes: In the past grapes have gone partly to market and partly to the Wine-maker. Both outlets took all kinds and classes of the fruit. The wine-maker, however, used mostly the Concord. In 1915 grapes for wine-making were reduced by two-thirds. Legislation and popular opinion is strongly reducing the amount of alcoholic beverages manufactured. The making of unfermented grape juice looks like the industry of the future. This industry will take only the best Concords. Therefore, we may classify grape production of the future in the following manner:

(1) Red varieties—Niagaras, Wordens, some Concords and other varieties grown for market.

(2) Best Concords for grape juice.

(3) Culls of all varieties for jelly making.

This third class of grape is the only one of low grade nature. By removing it from the other two classes, Ontario grapes and Ontario grape juice will become more popular. The jelly and jam making business of Ontario is growing. Grape growers will be able to dispose of more and more of their small bunches of unevenly ripened fruit.

PEACHES: Low grade peaches consist of:

(1) Undersized fruit.
(2) Overripe fruit of all sizes.
(3) Split peaches.
(4) Windfalls.
(5) Peaches with gum spots.
(6) Scabby peaches.

The most promising way to dispose of these peaches is to stop producing them. Seriously, no grower can afford to stop improving his organization for producing and handling his crop. Granted, however, the greatest efficiency some of these low grade fruits are bound to appear.

Undersized, split and scabby peaches if not too ripe may be used in the canning factory for pie peaches. For this purpose they are sliced and canned in water. This product is cheap, but should dispose of a great deal of our peaches.

Overripe and gummy peaches and windfalls should be used for jam making. Peach jam is not very popular. It is not advertised sufficiently to be known by the public. We made some at Vineland this year, however, which was very good. Fairly large quantities were made in commercial jam factories. The question might well be asked: "Why could not a large quantity of peach jam be sold for army purposes?" It could be prepared cheaply, is very healthful, and anyone who tastes well made peach jam will agree that it is a splendid product.

The idea of evaporating our peaches is promising. If such an industry were established here many undersized peaches could very likely be used.

In this connection it may be pointed out that local canning factories and evaporators if run properly and successfully will not only accept much low grade fruit but will prevent much of the waste due to overripeness. Because factories are nearby the grower can dispose of greater quantities with less labor. Therefore, there will be less spoilage.

AMALGAMATION IN THE NIAGARA PENINSULA.

J. R. HASTINGS, WINONA.

I do not believe it is necessary for me to spend any time reviewing the situation as it exists. We have been told "United we stand, divided we fall." The fruit crop of the United States is handled in a co-operative way, and in that country they have gone beyond the local organization and have established state organizations, and at a meeting held at Chicago they propose going still further and organizing a national association to take in all the state organizations. It would look as though the people of the United States had found the co-operative plan to be the best one for their purposes, and I believe sooner or later this Dominion will see it in the same light. I don't know to what extent co-operation has been successfully used in Canada. Motives for co-operation have not always been identical. Instances have been found where the motive has been selfish. We have other instances where the desire has been to better conditions, and we have many other instances of where no other mode of doing business has been used. In some new industries men saw from the very beginning that co-operative methods were the best to employ. I believe as a general thing co-operation has been the result of adverse conditions; it has been the child of adversity. We know that competition in many lines of business has been so keen and so ruinous in its methods as to threaten financial destruction. The men interested have begun to think mighty hard, and there have been meetings held with the result that the various interests have amalgamated or co-operated. These men have decided to quit cutting each others' throats.

Before we can intelligently discuss amalgamation in the Niagara district we must first of all see what the conditions are at present. We have with us the pessimist and the optimist. The optimist thinks the fruit industry is in a fine condition, he sees everything in a rosy light, I sometimes doubt whether these men are sincere, whether there is not some method in their madness. The pessimist will tell you that the whole bottom is dropping out of the fruit industry. Some men might believe the pessimist when he gets up and says that between Hamilton and Niagara there are several hundred thousand acres of land in the market. I am not saying that there are many fruit farms in that district for sale but that is what the pessimist says. I believe the middle course is the proper one to take. I believe it is absolutely necessary that something should be done to bring relief to the fruit growers and place the fruit industry on a more safe and satisfactory basis than it is at the present time. This brings us pretty close to the subject we are now discussing, amalgamation. I am going to use the word co-operation. I do not know any reason why the district this side of the lake cannot be considered at the same time. The first question that we will ask is: Is it admitted that the fruit industry is not in a satisfactory condition, and is co-operation the only remedy? Can co-operation be put in successful operation in the district? And, what may we reasonably expect it to do for the individual grower? We have in the district at the present time a number of co-operative associations. Some of them have not been very successful, but through no fault of the co-operative system. Some have been successful to a small degree only. One, I believe, has given very satisfactory results to its members. I attended a meeting at Grimsby a short time ago at which the question of co-operation for that district was discussed. One gentleman present on being asked if he would become a member of the organization became uneasy. I think he turned a trifle pale. In the most emphatic manner possible he let it be known that he and his associates did not propose to take any steps that might offer the slightest chance of placing their present relations in jeopardy. The individual referred to was quite a public man and also a member of a small co-operative association having its headquarters in that locality. It would appear that the members of that organization are well satisfied with the results. I am told that the observant man does not have to be told the men who are members of that association; they can be picked out anywhere. The average fruit man has a very hungry look and an uneasy expression. They tell me that when the co-operator has his fruit ready for the market he knows where it is going and goes on his way rejoicing. That is what co-operation on a small scale has done. We might ask "If co-operation on a very limited scale and under the most adverse conditions will bring such satisfaction to its members, if all these adverse conditions were eliminated would not we have still better results?" There is no reason why it should not be done. I do not believe that there is a man who has given the matter the slightest consideration who will deny that better results, financially and otherwise, will come from co-operation. I do not believe that money is the only thing to be considered. I believe that co-operation will give us something that cannot be measured in dollars. The man who cannot average up all the results that come from co-operation will never make a success of it, he will be constantly tempted by the extra five cents or one cent per basket that some interest antagonistic to co-operation will dangle before him. This kind of a man should never be asked to enlist.

You might ask what claims do I make for co-operation? When I speak of a co-operative company I have in mind a properly organized and well managed co-operation having the loyal and steadfast support of its members and controlling a sufficient percentage of the fruit in the district to enable them to employ the most efficient methods in management.

The first claim I will make for successful co-operation is:

1. It will relieve the fruit grower of the task of marketing his fruit and enable him to give more attention to details, which he is better qualified to attend to.

2. It will give him the highest price, that under all the circumstances he is entitled to receive. It is not going to give him the highest price he might get.

3. It will furnish him with supplies of practically all kinds at lower prices than he could otherwise get. It will render less irksome some of the tasks he has to perform. It will make him more satisfied and contented and consequently a better citizen and a more useful member of society. I will not claim it will take him to heaven, but it will go a long ways towards keeping him out of the other place. Order is one of the first laws of heaven. A man who becomes a good co-operator obtains order. I said he would become a more satisfied man and there is no question about that. If co-operation will do no more than market his fruit for him and give him as much money as the other man gets, then it has done a great deal to make him a satisfied and contented man. There is no reason under heaven why the fruit industry should not be a profitable and pleasant one. We have men in the fruit business as we have in every other walk in life who rise far above their fellows. These men market their own fruit and get probably as high a price as does the member of the co-operative association. There is no reason why co-operation should not aid the orchardist in the selection of his land and guide him as to the best varieties of fruit to plant. Here is one of the little things that co-operation might do along with a number of others: A well ordered co-opera-

tion would have a qualified man whose duties it would be to give advice and guidance in all matters of planting, pruning, spraying, packing and so forth. I do not want to convey the idea that it will act as a sort of wet nurse for the fruit grower; it won't do that.

Is it possible to put some organization in operation in the Niagara Peninsula? It is in my idea entirely possible. The western end offers an ideal field for such a venture. No attempt should be made until every detail has been put in perfect shape and the whole organization made ready for the work. For the present I would not suggest an organization to take in the whole of the Niagara Peninsula. I would confine my consideration to that portion from Jordan to a point east of Hamilton.

There are other interests that have to be considered besides the fruit grower. What about the dealer and commission man? And the managers of the companies already in existence. We have some excellent men in the fruit business, men who could afford to do without us a great deal better than we could afford to do without them. It would be absolutely necessary to have the assistance of these men. The relation between the fruit grower and the commission man would be slightly altered. All of the dealers who are also fruit growers would be invited to become members. Some of the dealers would be asked to maintain their present connection as distributors. I can imagine the smile that will spread over the faces of some of our dealers at being asked to maintain their present position. I think arrangements can be made between dealers and co-operators that will be satisfactory to both sides. A few good men will be required to fill certain positions for which some of the present managers of co-operative associations are well qualified. I believe that when the organization gets well under way the different interests will find their proper places. One of the reasons given for lack of co-operation is that fruit dealers are too suspicious of one another; personally I do not take any stock in that argument. I believe that nearly all the best fruit growers will become members of this organization if they can be satisfied that it will be well managed and their interest properly taken care of. One of the large dealers, who is also a large grower, said to me that co-operation could not be put into effect on account of the perishable nature of the product to be disposed of. I think that is one reason why co-operation with its efficiency should be called into being. I believe lack of distribution is one of our principal troubles. A large distributor knows the points he is supplying and he knows the dealers at these points, but none of them know the points that are overlooked and not supplied with fruit. There must be something more put into force than the scattering all over the country of a lot of price lists to the amusement of the dealers. A company acting in close co-operation would note every point, not only in Canada, but elsewhere, where there was a market for fruit, and certain points that are not now taking fruit, it would be up to this organization to sell them fruit.

How are dealers to get their supplies? They will get them from the co-operative company; it will simply be a question of putting in an order. I think a board of ten or twelve men could be selected who would be capable of managing the organization, and they could select three men to act as an executive committee and these three men could pick out from the brains of the whole district a capable manager who could properly administer the affairs of the association. Two plans were discussed at the Grimsby meeting. One was fashioned somewhat after the plan of the California Fruit Exchange, but I am opposed to that plan for more reasons than one. Sixty to seventy-five per cent. of the business west of Vineland is done by express, and for that reason a central selling agency would not be successful.

THE ADVERTISING OF OUR TENDER FRUITS.

W. H. Bunting, St. Catharines.

Many will remember the remarkable success which attended the publicity campaign carried on by the Department of Trade and Commerce of the Dominion in the fall of 1914, when disaster threatened the apple growers of the Province, owing to the abnormal conditions resulting from the dislocation of trade channels immediately following the declaration of war. This campaign succeeded in stimulating the domestic consumption of our staple fruit to such an extent that those growers who had carefully harvested their apples found during the season a receptive market for their fruit at fair prices, and indeed a somewhat bare market before the apple selling season closed.

This achievement was a wonderful object lesson in the power of the press, and the advantages to be obtained from a systematic and well considered effort to bring producer and consumer into more intimate relations with one another to their mutual benefit.

Early in 1915 it became apparent to a few of those who were largely interested in the production of the more tender fruits in this Province, that unless some active steps were taken to increase domestic consumption, a large portion of a prospective large crop of small fruits, as well as the various tree fruits which was in evidence, would in all probability not find a satisfactory market, and might of necessity become a source of severe loss to the producer and result in very great waste.

The tender fruits, while extremely beneficial and valuable to the community at large, have to some extent been looked upon, owing at times to comparative scarcity and somewhat high prices, as more of a luxury and for use on special occasions, than as a regular portion of the daily food. There was in consequence a well-grounded fear that in the stress of strenuous times fruit consumption might be seriously restricted unless some steps were taken to impress upon the public generally the advantage of a fruit diet, and also the favorable opportunity which was likely to be presented to indulge in the free use of first-class fruits at extremely moderate cost during the approaching season.

The Niagara Peninsula Fruit Growers' Association, an organization which is in very close touch with the pulse of the large mass of growers in that district. took the matter up at one of their early spring meetings, canvassed the situation thoroughly, and immediately took steps to profit by the experience resulting from the publicity campaign of the preceding season. A strong and representative committee was appointed to be known as the Niagara Peninsula Publicity Association, with energetic men in charge of the work who undertook to carry the campaign through to a successful issue. Subscription lists were opened and some $2,000 dollars were soon secured from a considerable number of individual fruit growers. The movement was endorsed by the County Councils of Lincoln, Welland and Wentworth, and several of the township councils, all of whom assisted financially to a substantial extent. And thus the movement was launched. It became evident that the Association thus formed would be eligible to participate in the Provincial grant provided for such purposes, and so from all these sources it was felt that the financial problem was fairly well solved.

An executive committee was named to work out the details of the campaign. The services of Peter McArthur, of Appin, the well known journalist, were secured to assist the committee in the preparation of suitable material for the press. An advertising agency was engaged on favorable terms to handle the placing of timely information before the public, with the result that for over four months of the shipping season bulletins and interesting reading articles, calling the attention of the people to the fruits in season, appeared weekly in over 250 newspapers scattered throughout the Dominion, chiefly of course in our own Province of Ontario.

This work on the part of the Niagara Peninsula Publicity Association has been very considerably supplemented and reinforced by the more general advertising carried on by the Dominion Fruit Division, for which great assistance the fruit growers are deeply grateful.

Now that the campaign for 1915 has been brought to a close fruit growers and others are enquiring, "What has been the result? Has the game been worth the candle? Have the funds been wisely expended? Have results justified the effort?" To all of these queries those in closest touch with the movement reply with an unqualified, "Yes." Although the crop, as expected, was large, and although at times the season was very unfavorable, the consensus of opinion of those best qualified to know, and the reports coming in from all quarters, go to show that notwithstanding strenuous financial conditions throughout the country, and with many of the canning factories which had been accustomed to absorb large quantities of fruit in previous seasons shut down for the entire year, and with many imperative and unusual calls upon the public purse, at no time during even the heaviest shipping season was there any serious retardation in the movement of the crop. Distribution was very much better than ever before known, and hundreds of families throughout Canada not heretofore in the habit of using domestic fruits have been induced to make use of them quite freely.

Prices were low, of course, but that condition was expected and anticipated and the general public have had the opportunity as never before of large quantities of splendid fruit at prices within the reach of all, and they have not been slow to take advantage of this opportunity when properly brought to their attention. Towns and villages took care of hundreds of baskets and half and full car loads of fruit, where in previous seasons extremely small shipments sufficed to fill their requirements.

While the situation has been a critical one, and few growers can be said to have had a profitable season, the large crop has gone into consumption, the general public have had the benefit of cheap fruit fairly well distributed and the fruit growers have had impressed upon them the fact that for the future one of the factors of success must be their ability, by correct business methods, to so economize in the cost of production and distribution, as to place in the hands of this host of consumers good fruit at reasonable prices and still have a margin of profit for themselves.

To this end all parties interested must co-operate. Fruit grower, transportation agency and dealer must work together, so that no one of the various agencies engaged in the work of fruit distribution may have an undue advantage. The fruit industry of this Province is capable of great expansion under proper encouragement. Thousands of young trees of various sorts planted during the past few years are now coming into bearing. There is plenty of additional soil more suited to the production of fruit than anything else, and it is the height of wisdom to plan ways and means whereby these prospective fruits can be placed where they will be properly appreciated and made use of.

T. B. Revett, Niagara-on-the-Lake: I had hoped that Mr. Bunting would have shown some of the benefits which we received from this advertising campaign.

I have been asked to criticise the advertising campaign. I am not an expert on advertising and would not for one moment say that advertising does not pay. Every man in the Dominion of Canada will tell you that advertising does pay, but as a fruit grower I want to see the returns for my money. I want to see the money I put into advertising bring me back some more money. I want to see advertising brought to the point where it will bring the producer and the consumer close together. Take for instance the advertising that a certain kind of peaches will be coming in next week and a certain kind of plum at a certain time. That is general advertising. It is telling the people that the fruit will get ripe, it is not bringing any direct profit to the grower. We are in the business of fruit growing to make money. We all know that it is a nice occupation, but the main factor in it is the difference between the cost of production and the handling and the amount you receive. If we have a general advertising scheme like that and you get a number of people looking for peaches, one man may say, "I will sell for two cents cheaper," and he gets the order. Or a dealer may say, "I will give you two cents less and you can have my order." We do not know whether that dealer is telling the truth or not when he says he can buy them for two cents less than the quoted price, but we do know that we often lose business if we do not come down to that price. If we are going to take advantage of this general advertising and put an advertisement in every one of these papers that we have peaches and plums and apples and pears to sell, and we want so much a basket for them, what is going to be the result? We will not have merely one hundred different quotations but thousands of different quotations, and I do not see where that is going to leave us. The only thing that is going to help the fruit growers is the matter that was brought up here to-day by Mr. Hastings, carrying co-operation a little further. We do not want to put our prices too high, what we want is a fair living wage and the only way to do that is by having a uniform quotation. I am not a large shipper of fruit. I only tried to sell fruit this last season and I didn't find that it was such a hard problem. I felt that it was my duty to find out what places wanted fruit, and when I did find out these places I would find that there were five or six different quotations in these towns. I don't see why we should start in and put the cart before the horse. If we are going to advertise then we must bring it down to some central basis. Why is not co-operation a success? I have heard time after time that it will be our salvation, but it has not come yet. There must be something wrong. Some people say we cannot trust one another. We must start at the bottom of the ladder, we must get our association formed, and we must first perfect the units and until we do that we will not be able to get any real benefit from any scheme. As a farmer, I have had hundreds of people offering me advice, but there is not one of them that will get out and do what they advise me to do. There is not one man that gets up at this convention and talks that carries out in his daily life what he has been talking about. The older men here in the fruit industry will remember the conditions of the grape market. From a high price they started to drop, and one year when they got down to 8c. and 9c. one grower said to me, "It is the best thing that ever happened to the grape industry." I said, "Why," and he said, "Low prices will attract customers and help in distribution." That is not the kind of help we want, what we want is something that will jack our prices up three or four cents. You can sell peaches at 20c. per basket as fast as you can pick them; you can give them away a little bit faster. I do not think it needs advertising to sell our peaches at about one-tenth of a cent per basket over the cost of production. What we want is something that will give us a better price for our product.

Mr. Robertson: I think Mr. Revett has left a wrong impression. We are interested in the dollars and cents, and our interest in the crop is the cash balance left after harvest. In addition to that we have a good district to live in and we love our work. I have been guilty of making quotations myself and I have received in reply: "Can you supply us at 3c. per basket less." I answered, "I can supply you fruit that has been shaken into the basket at a less price than fruit that has been properly picked and packed." I have received the reply, "I have been quoted plums cheaper than yours by 2c. per basket." I have replied to that, "These are Japanese plums and do not suit the trade. If that is what you want I can supply them at the price you name, but if you wish to increase your business you will have to sell fruit of a better quality than your neighbour, and these are our quotations for the best fruit." I generally get the order.

Mr. Bunting: Mr. Revett stated that I did not give any definite results of the advertising campaign. I hold in my hand a clipping from a London paper during the selling season, and this clipping might be duplicated one hundred times, it is entitled *Sold Eight Car Loads of Peaches in One Day.*

> THE DOMINION GOVERNMENT FRUIT CAMPAIGN BRINGS SPLENDID RESULTS.
>
> That the Dominion Government campaign advocating the preserving of fruit has been productive of results is well evidenced by the fact that on Wednesday last not less than eight carloads of peaches were sold in London where formerly eight carloads were sufficient to supply the city for a whole week.

I think, Mr. President, that is a sufficient answer. (Applause.)

PRECOOLING IN 1915 AND ITS RELATION TO THE EXTENSION OF TENDER FRUITS MARKETS.

Edwin Smith, Grimsby.

The precooling work at Grimsby is divided into (1) commercial cold storage and the precooling of fruit for the general public; (2) demonstrations in fruit handling, packing, precooling and transportation; (3) experimental refrigeration tests.

Strawberry Precooling.

The first precooling of the season was with strawberries. On June 28th a shipment was handled for the Vineland Growers' Co-operative for Winnipeg market. The berries were shipped by refrigerated express, and the car was opened on July 2nd. The berries arrived at destination without decay but sales were poor owing to a poor market. From an economical and temporal view the shipment was a failure. The fruit was ripe at the time of forwarding and was shipped in Ontario 24-quart crates—the poorest strawberry package that could be used for that purpose. The berries arrived in a fair condition so that from a physical standpoint the venture was successful and further trials are to be made.

Our experiments with the maturity of strawberries for precooled shipments indicate that while ripe strawberries lose in texture and will not stand the package pressure for this length of shipment, on the other hand, berries picked green advance but little in color when precooled and shipped under refrigeration. Strawberries must show some color, but must still be firm when picked for precooled shipments.

CHERRIES RESPOND TO PRECOOLING.

At the beginning of the season a carload shipment of cherries was made jointly with the Grimsby Fruit Growers' Ltd. and the Winona Fruit Growers', Ltd., to Winnipeg, including Early Richmonds and a few Black Tartarians. This shipment was of special importance for three reasons: (1) The Early Richmond is not considered as good a shipper as the Montmorency; (2) it tested sweet cherries on freight shipments to the West and (3) it gave sour cherries a ten day shipping test. As all lots arrived in Winnipeg in good condition it showed that Early Richmond cherries could be precooled and shipped west nearly as well as Montmorencies, standing a shipping test of ten days, and that sweet cherries may also be precooled and shipped west.

To demonstrate how precooled cherries stand up after withdrawal from the refrigerator car a part of the experimental shipment was re-shipped by ordinary express to Brandon, and arrived there in good condition, selling for a higher figure than those in Winnipeg.

Cherries that have been picked for ten days even though they have been under refrigeration will not stand up as well as freshly picked fruit. Ripening processes take place slowly under refrigeration and thus lower the vitality of the fruit. However, cherries will not perish immediately upon withdrawal from refrigeration and if they have not been under refrigeration for more than eight or ten days most varieties will stand up long enough for marketing. Upon first withdrawal from the refrigerator car there is a rapid condensation of moisture upon the surface of the fruit (not so heavy on the prairies as in the east on account of the low relative humidity of the air in the West). This gradually disappears, but the moisture has helped to germinate mold spores. During the day of unloading and distribution the cherries remain in good condition without much sign of change. After twenty-four hours from the car or on the following morning the fruit will appear in as good condition, but upon careful examination will show discolored spots, especially where it has been bruised. After thirty-six hours the discolored spots begin to show decay which begins to be serious after two days from the car unless kept in cold storage.

PLUM PRECOOLING.

The precooling of plums has been very successful from the first. Shipments in 1915 were more active and gave more satisfaction than in 1914, since better care was given by the growers to the maturity and condition of the fruit. The greatest distances that precooled plums were shipped were to Prince Albert, Saskatchewan and Glasgow, Scotland.

Plums retain their flavor and texture under refrigeration better than any of our tender fruits, and during the past year fears of shippers and the trade relative to the keeping quality of precooled plums have been allayed. Our experimental tests with plum varieties have been made to determine which varieties are suitable for long distance shipments after precooling. The following have proven most satisfactory: Bradshaw, Monarch, Grand Duke, Reine Claude, Damson, Abundance and Burbank.

Much difficulty has been experienced in shipping tomatoes to the western provinces, due largely to a lack of tomato shipping information and standards. Thus far precooling has not helped to any extent since when picked firm enough for ordinary shipments the tomatoes would not have color enough for a precooled shipment. During 1914 one shipment of over-ripe stock was precooled and met with bad results. The cause of the loss was attributed to precooling. Demonstrations in 1915 have shown that it was not a question of precooling so much as one of maturity. For a precooled shipment the tomato must have color but must still be firm enough to stand the necessary package pressure; the tomato must be free from cracks for best results.

Few Peach Shipments.

During 1915 peach shipments from Ontario to the western provinces were very light. A greater tonnage of cherries was precooled for western shipment than of peaches. The small western movements were due to fairly good local demands in the early part of the season, a late crop in Ontario and low prices in the West at the height of the marketing season. Low prices in the West were due to (*a*) a large consumption of California, Washington and British Columbia peaches before the Ontario shipping season had started and (*b*) the lower cost of Washington and British Columbia fruit.

From a physical standpoint the precooled peach shipments were very successful. A shipment of Early Crawfords was two weeks under refrigeration and arrived in Winnipeg in good condition. A successful shipment of Elbertas was made to Glasgow. The farthest western shipment was to Prince Albert, Saskatchewan.

Tests with the maturity of peaches for precooled shipments show that a peach must not be green at the time of picking, but must be picked before showing any indications of softening as ripe peaches become mealy, lose flavor and are practically worthless when held for any length of time under refrigeration. Tests have shown that such varieties as Belle of Georgia, Yellow St. John, Early Crawford and Elberta, if properly picked and packed, may be precooled and shipped to nearly any part of the Dominion.

Extension of Markets.

It has been shown that by precooling the better varieties of our tender fruits, not including berries, they may be shipped to remote parts of the Dominion without decay or waste. With the exception of sour cherries, the western shipments of which increased some 900 per cent. in 1915 over those in 1914, the surplus of Ontario's fruits has not felt the influence that precooling has on the extension of markets. The reasons for this are obvious.

In the past the Ontario grower has been marketing a high priced product when compared with prices received in other districts in North America. Abnormally high land values and a very great increase in production have followed. Before the increase in production was felt cheaper fruits from the United States came across the border to be used in Canadian canning factories and to fill up the outlying markets in the Canadian prairies. The importation of fruit for these markets became an established trade and one that is hard to break off, so that during 1913, the year when tons of tender fruits rotted on the ground in Ontario for want of markets and when calamity first stared the Niagara district fruit growers in the face, the Dominion of Canada imported from the United States

12,149,207 lbs. of peaches, 6,197,700 lbs. of plums, 6,026,691 lbs. of grapes and 11,054,228 lbs. of pears, apricots, quinces and nectarines—or an equivalent of 1,767 car loads of tender fruits such as might have been grown at home. The importation of tender fruits from the United States has made a steady increase and to-day is greater than it ever has been.

Our Fruit Commissioner's reports indicate that a large proportion of these importations go into our prairie markets. For three weeks during the peach rush of the past season arrivals in Winnipeg ran as follows: 1st week, imported 30 cars, Ontario 13 cars, British Columbia 10 cars; 2nd week, imported 22 cars, Ontario 10 cars, British Columbia 16 cars; 3rd week, imported 25 cars, Ontario 10 cars, British Columbia 18 cars. Points further west have been consuming imported fruit at a rate to make ratios even more striking. Without doubt we have let markets slip out of our hands large enough to consume more tender fruits than Ontario is producing to-day, and the reason for this has been the extraordinary prices we have received in Ontario and Quebec in the good old days.

The Ontario peach is not largely used in the Prairie provinces owing to the heavy purchases of Washington Elbertas by the wholesale trade early in the season. The trade prefers to purchase Washington Elbertas over Ontario because of their earlier season, their dependable packing, and formerly because of their lower cost. Because of the past failures in shipping it is now difficult to make f.o.b. sales of Ontario peaches to the western trade, and it is going to be very difficult to capture even a small part of the peach trade from the United States.

The only way that we can interest the western trade is to show them that they can secure a better article for less money in Ontario than in the State of Washington. By precooling, proper packing and good salesmanship, this can be done.

In the past the Ontario shipper has demanded high prices in the West to meet the risk of long distance shipments. In the future he will have to wipe out this risk by precooling, and thus sell at a price that will come under the lowest price his competitor can make. At normal times the minimum that Wenatchee or Yakima peaches can be laid down in Winnipeg or Brandon is 75c. per box. Deducting freight, icing and precooling charges, and we have 58c. at the Ontario shipping point. Deduct packing and selling charges and 37c. is left to the grower for 20 lbs. of peaches. In order to compete with the Washington grower the Ontario grower must grow his peaches for 1½c. per pound.

By eliminating the risks of long distance shipments through precooling and lowering the cost of the fruit to the consumer a large increase in consumption will result. One shipment of precooled cherries was sold in Winnipeg by the T. Eaton Co. for 50c. per 6-qt. basket. So eager were the Winnipeg housekeepers to secure fancy cherries at so reasonable a price that the entire carload of 2333 baskets were sold in 30 minutes.

One shipper has made the statement that by systematic salesmanship and by making precooled shipments the entire Ontario cherry and plum crops could be marketed in the Prairie provinces with greater net returns than are now being received with the added markets of Ontario, Quebec and the Maritime provinces.

In 1901 the population of the three provinces to the West was 419,512. In 1911 this had increased to 1,322,709. Is it not safe to say that by 1921, only five years hence, this population will reach 2,500,000? By that time are our importations of tender fruits from the United States going to increase from 1,767 cars to 2,500 cars, or are the growers of Canada going to extend their markets to absorb the increased demand for fruit? By precooling we can deliver the goods to these remote markets, and it only remains for the growers to decide how much of the trade they wish to supply, or how much they wish to give to the United States.

Mr. Armstrong: You would favor shallower baskets?

A.—Yes, probably the package used in the South in Georgia is the best. The four-basket crate of British Columbia is liked very well.

PACKAGES FOR LONG DISTANCE SHIPMENTS OF TENDER FRUITS.

J. M. Creelman, Grimsby.

The question of fruit packages has been a much mooted one for some little time now, and a very estimable aim has been for the standardization of fruit packages. Needless to say it is a very hard question to handle, and so far no one has completely coped with it. I do not mean in this discussion to recommend any standardization, but simply to give you as we saw it the results of our experiments with some packages for the shipments of strawberries, cherries, and peaches.

We did not try all the packages, in some cases, that are used in different parts of this continent. Any one who has made any study of fruit packages at all will back me up when I say that there are a considerable number of different packages which are used in different parts of the country, and so it is hardly possible to test them all at once. However, we did have most of those which we believed to be the best.

In this paper I intend to take up the work we did during the past summer at Grimsby, and will treat only from the standpoint of long distance shipments. The local markets are a district phase, but a package which is suitable for long distance shipments is usually suitable for local disposition unless too expensive. That is, the local market may not pay a sufficiently remunerative price to pack in such a package. However, I shall disregard this phase altogether in this paper.

The points which any package must have to be satisfactory are rather diverse, but are all essential. First, a package must be strong enough to stand shipment without serious damage to itself or its contents. Secondly, it must be so constructed as to give the maximum of protection to the contents. Thirdly, it should be attractive in appearance itself and in the way it shows off the fruit. Fourthly, yes, I put it last on purpose, because it is a factor which may be reduced and one in which there is a certain elasticity, too, the cost of the package must not be prohibitive. Then there is a fifth point, which, although not absolutely necessary, nevertheless it is one which should not be overlooked. The package ought to be planned for "efficiency." Efficiency in loading and handling. This is a point well worth some good, sound thinking over. Of course you must also, to some extent. consider the market's demands, but this is a lesser account because this can be changed by education.

Another thing we must take into consideration is the tendency apparent to reduce the size of fruit packages. We see, in the case of apples, the tendency is to use the box rather than the barrel. And for soft fruits we see an increased use of the 6-qt. basket, where formerly the 11-qt. basket was used nearly altogether.

The 24-qt. crate commonly used for the shipment of strawberries in Ontario does not measure up to any of the requirements which we named. It is more or less fragile, often being broken in transit. It is a rough, unattractive looking package and does not as a consequence do the fruit justice. It is easily pilfered. and in car lots loads very badly on account of the handles.

However, its greatest fault is in the dividers. These are of veneer and rest on the fruit rather than on the edges of the boxes. In this way the whole weight of the two upper layers is on the lower ones, and the separators resting on the fruit will crush it. With this form of separators or dividers it is impossible to fill the cups up without crushing, and if not the Fruit Inspector will have you over the coals for not filling them. It has been found also that the fruit upon shipment settles so that it looks to have been only partly filled. Here, again, the Inspector may get after a man when he has in all good faith filled the boxes up before shipment.

An experimental shipment was made to Winnipeg through our plant last summer by the Vineland Growers' Co-operative Co. These berries were in Ontario 24-qt. crates and were shipped by refrigerated express. Included in the car were lots of the B.C. 4/5-qt. and B.C. Full-Pint crates. These are the two packages used by the shipping districts of the Western States and British Columbia.

The fruit in the crates were found to be rather unattractive in appearance. The crates were somewhat damaged and the berries were badly settled in the cups.

The B.C. 4/5-qt. was in better shape, but here again the berries were settled in the cups so as to look as though they hadn't been properly filled.

The B.C. Full-Pint was in the best shape. The berries were not settled, and were bright and attractive, and along with the 4/5-qt. this package was much more attractive to look at.

However, it was when the financial returns were examined that the big difference was apparent. It was found that the B.C. 4/5-qt. was only selling for 20c. more a crate than the B.C. Pint, which in turn was selling for 10c. more than the Ontario crate. Figure that out. The B.C. Pint was selling for 10c. more per crate than the Ontario 24-qt. crate, and certainly only about half as much fruit.

This package, the Western Full-Pint, is the one used principally by the shippers of Hood River, Oregon and Spokane, Washington, and British Columbia. It has very largely supplanted the larger 4/5-qt., as it brings higher net returns. In Winnipeg it brings from $3 to $4 to the wholesaler.

So far I have considered only shipments to the West, where I feel safe in saying that if we are to compete in that market we must use the Pint Hallock crate.

In the Eastern markets we have a separate and distinct problem. I think you all agree with me that the Ontario 24-qt. crate is unsatisfactory, and I have shown it to be of no use for Western shipments. Now the Pint package is not likely to ever find favor in the East, as it is a package for use where high prices rule. Then, as for the 4/5-qt., it is also rather doubtful, as the Easterners look askance at the raised bottom and call them "cheaters." The package that is more likely to be of use is one of the type of the American crate or our 27-qt. or 36-qt., with thicker strips in the dividers. This would tend to reduce crushing, and would still retain the cups the market is used to, and also this type is larger and more pilfer proof, and is easier to load as it has not handles. Further, it is more attractive in itself and displays the fruit better.

In summing up the strawberry work it seems to resolve itself into this—For shipments to the West use the B.C. Full-Pint crate, and for Eastern shipments we will have to adopt either the American crate or our 27-qt. or 36-qt. to our needs.

We had assured ourselves by practical experiment in the season of 1914 that sour cherries could be marketed in good condition in Winnipeg, and then we wondered whether we were using the proper packages. This question was always in the minds of the British Columbia growers, and so we decided to test the relative merits of the Ontario 6-qt. Climax basket and the 4-basket Plum crate which was used by the British Columbia people.

A mixed carload shipment was made and a comparison was thus arrived at. There was not much to pick and choose between as for condition, but there was a difference in returns. The 6-qt. Climax sold at an average price of 60c., which netted the grower 38c., or 4.78c. per lb., while the 4-basket crate averaged $1.46, which is a net return of 85.1c., or an average of 4.24c. per lb.

Then there was a factor which cannot be expressed in figures or illustrated, but it was found that the 6-qt. basket sold much more readily than the 4-basket crate.

Having satisfied ourselves we could ship sour cherries to Winnipeg, we decided to try some sweet ones. Also we decided to make a package test. With this end in view shipment was made to Winnipeg in the B.C. Full-Pint, the B.C. 4/5-qt., the 4-basket crate, and the Woolverton crate, this last is a crate containing 3 6-qt. Leno baskets. It was found that the fruit in the best condition was in the B.C. 4/5-qt. and Pint. The Pint also gave the best returns, as it averaged the grower a net return of 14.3c. per lb., with the 4/5-qt. second, with 11.5 per lb.

The Woolverton crate shows itself to be a commendable package for shipment from the field without repacking. I forgot to mention it, but the other packages were all repacked and faced in the warehouse. It comes a close third, with an average of 10.3c. per lb. net. The 4-basket crate was a poor fourth, with only a net return of 6.5c. per lb.

This seems to be simple, as here we have again the same package as we recommended for strawberries. I ought to say, also, that this package also sold fairly well in Montreal. They do not seem so adverse to taking cherries in it as they do strawberries.

In peach packages we also found there was quite a controversy as to just which packages were best, and so we tried out a number, namely: The 6-qt. and 11-qt. Climax baskets; the 6-qt. and 11-qt. Leno baskets in the Hunter and Woolverton crates; the Michigan bushel basket, and the Standard Peach box.

These packages we observed, and had others express their opinions on them.

The method of behavior of the Climax basket is in long distance shipments more or less known to us. It is fairly satisfactory under some circumstances, but is not a trustworthy package; that is, it is very easy to put up a dishonest pack. In fact, it is easier to do so than otherwise, and this is not a satisfactory condition. And it is very easily broken, and does not display its contents overly well.

The Hunter crate is a two-storey affair which holds 4 11-qt. or 6 6-qt. Lenos. It is of rough undressed lumber, which rather depreciates for its appearance. Further, it is very heavy, weighing about 80 lbs. It is then a bulky package, and not an appealing one to look at. Further, it is found that it is not altogether satisfactory for long distance shipments, as the fruit on the top cannot be packed perfectly firm, and moves very slightly with the motion of the car. which on a long journey is likely to cause a bruise or soft spot from this rubbing. It may have its use as an express package, but it is not pilfer proof and is unattractive. Dressing of the wood might help this to a large extent.

The Woolverton crate is a much more attractive crate. It is smaller, and is built in two sizes, for 3 6-qt. or 3 11-qt. Leno baskets. The cover is solid, of two pieces, and the sides are near the top, which makes it pilfer proof. It is rather open at the bottom, and so allows for good ventilation. It is strong and yet is not heavy as it weighs about 35 lbs. for the 6-qts., and 60 lbs. for the 11-qts., or maybe a little heavier. It is a much more attractive package, but has the same fault as the Hunter crate in that the jarring causes trouble from bruising. This package, however, seems to be admirably suited for express shipments of small lots. In fact, its worst fault is that it is too bulky to be of use for carload shipments. That is, you fill your car full and yet have not your minimum weight.

This last is also a fault of the Hunter crate, which I forgot to mention.

There has been an impression gaining headway among some fruit growers that the bushel basket, as used in a number of the American peach-growing districts, was just what was needed in this country. With this idea we made a shipment of Elberta peaches in bushels to Winnipeg. These were picked hard ripe and packed in these baskets, which had a post in the centre for support and a paper pad over the top for protection.

The fruit arrived in Winnipeg in excellent shape, but would not sell. In fact, they hardly brought the freight and icing on them.

Here seems an odd state of affairs. The package was attractive, in its way; was strong enough; it loaded easily in the car; was cheap; but here the market did not want it. Why? Well, I simply summed it up this way: Peaches in Winnipeg, as in nearly all the West, are more or less of a luxury, being comparatively high-priced, and being so they are used to them in an expensive package and so were not taken to these. They expect their expensive fruit put up right, and will pay for it that way. Look at the case of sweet cherries. On the other hand, we see the sour cherries. These are a cheap preserving fruit, and so they do not want an expensive package, and so prefer them in the 6-qt. basket.

This practically throws the bushel basket out as a peach package for long-distance shipments, because it means that although it may carry the peaches in good enough shape by the time they go some distance they are too expensive to bring good prices in a large package because people can not afford to pay a high price for a lot.

Then, in the West, we look to see the high class package in which the peaches are sold. We find there the standard western peach box 18½ in. x 11½ in., and with varying depths from 4 in. to 5 in. Practically all the peaches that came into the West are in this case. At least all that came in from Washington, Oregon and British Columbia. In it the peaches are packed in a diagonal pack and are wrapped in tissue paper. This seems to be the ideal package. It is strong, attractive, displays the fruit well if properly packed, loads easily in cars, is excellent for express shipment, pilfer proof, with cleats allows plenty of ventilation, is the most efficient to handle, if trucks are used; and, despite the fact that people think so, it is not hard to pack. It is in my opinion the package for peaches.

I would just like to say here regarding the shipment of peaches to England that I believe this is the only package in which this can be economically done. I had always heard it said that to put peaches in England you ate up all your profits in packing. I will admit that all I saw packed were certainly eating up a bunch of profits in excelsior, etc. Personally I saw no reason why hard ripe Elbertas should not go to England in a straight commercial pack. So this summer, when the Grimsby Co-operative Growers were shipping three cars of pears to Glasgow, we put in fifteen cases of Elbertas packed commercially, that is, just wrapped in paper. To make it perfectly commercial I had one of the girls pack them up and I told her nothing except that I wanted them packed.

I was highly pleased with the result, as, although there was some waste in the pears, the peaches were in excellent shape and sold for 4d. to 6d. apiece.

I am not prepared to say that I believe there is a market for Elberta peaches in England, because I understand that the English people prefer to have a round, highly-coloured, white-fleshed peach rather than an oval, yellow-fleshed one like the Elberta. However, I have my eye on a variety—the Belle of Georgia—which seems to stand storage very well and conforms to that standard of round, white-flesh peach and is highly coloured. Further, I am told by Mr. Harris, of the Vineland Experimental Station, that it is a pretty good variety as far as the grower is concerned. So we may see Canadian peaches on sale in England after the war.

To sum up, I would repeat that for shipment to the Canadian West I would use for strawberries and sweet cherries the British Columbia Full-Pint Hallock crate; for sour cherries, the 6-qt. Climax basket, and for peaches the Standard Western peach box.

WOULD BARRELLED APPLES SELL FOR MORE MONEY IF THEY WERE MACHINE GRADED?

W. F. Kydd, Toronto.

I do not believe the general public—and I won't say anything about the Old Country market, but merely of the Toronto trade—I do not believe the people of this city want three sizes in a barrel of apples or any other kind of package you put them in, whether it is a barrel, box or crate. I say that the apples should be graded and the package should contain the one size. A restaurant-keeper does not want a certain size, because it is not suitable for baking or for peeling for pies. They want an apple of a certain size. Then there is another class of people in the city, the wealthy people, who want a smaller apple, about the size that a man or woman can eat, and I claim the apples should be graded for these reasons. Although some apples are small, they are worth more money to some people. I was talking to one of the largest apple buyers in Toronto the other day, and he said he was convinced in his own mind that he could sell apples for more money if they were of an even size instead of three or four different sizes in one barrel, and he asked why we did not grade our apples. You can put these apples through the machine grader and it can be done very quickly. The Department bought two graders this last fall and worked them in two different sections; the machines do not injure the apples in any way. The graders cost $55 in Rochester; $21 for duty and $3 for freight. They can be laid down for less than $80. They start at two inches and can be regulated every quarter of an inch up to 3¼ inches, and they do the work well. I would like to see our No. 1 apples put up in three sizes in the barrels, and the No. 2's put up in three different sizes. Then if a dealer wants to buy apples, he knows what size he wants and he can get that size. I do not see why the great majority of our apples should not be No. 1's. I think, outside of the Spies, we can grow 85 per cent. of No. 1's if the trees are properly sprayed and pruned.

SHOULD THE GROWER BE COMPELLED TO PUT HIS NAME ON OPEN AS WELL AS CLOSED PACKAGES?

P. J. Carey, Toronto.

Being an inspector since the beginning of the operation of the Fruit Act, I presume is why my name is placed opposite this question. I have been inspecting fruit on the Toronto market since 1904. In the beginning, when the small fruit was shipped to Toronto, the custom was to put numbers on the packages. These were put on for several reasons. The commission men who received the fruit from a certain grower had it numbered and it was very handy to have the numbers on, but the inspectors found that in some cases they would find a violation of the Act on a package of a certain number, and on calling the commission man's attention to it, he would say, "I do not know just who that number belongs to, but you can get it by going to the office," That became rather a nuisance, and we had to threaten the commission man, because he was liable to a fine; and as soon as we did that they very quickly gave us the name.

Fruit in open packages does not require to be marked with the name of the packer. I am in favor of every man putting his name on every package he puts up. My experience of inspecting fruit in Toronto is that in nine cases out of ten, where there is a violation, the name of the grower is not on the package. I do not say for a moment that all men who use numbers are fraudulent packers, because some of the very best men are using numbers, but as a matter of fact a large percentage of the men who are putting their name on are the best packers. The wrong doing can be traced much easier if the name is on the package than if there is only a number. Very often the names are put on the basket in such a way that they cannot be read, and the same thing applies to the numbers. If the name or the number is properly stamped on there is no trouble.

In the beginning of the Fruit Marks Act, it was thought all open packages should be exempt from being marked, and all closed packages should be marked with the name of the packer. During the first two years the President and myself made many inspections of all sorts of packages, and we found all sorts of names and initials and marks that were indistinct, and the real name of the packer was kept off for reasons which you may judge for yourself. In those days we thought the law should be amended, and the law was amended, and every packer had to put his initials and his full surname on the package. That revolutionized the whole packing of Canadian fruit, and we found very little fraudulent packing where the man put his name on the package. It was good in those days for closed packages, I think it is good now for open packages. Therefore, I want to say that in my judgment, after spending sixteen years in the work of inspecting and observing the fruit packages, one of the most important things is that the name of the packer should be on the package whether it is closed or open.

A MEMBER: The name of the packer or the grower?

MR. CAREY: The law has defined the word "Packer" to mean "Grower." As far as small fruits are concerned, all growers are packers. In the old days the packer was presumed to be the owner, and in the first year of the Act the law said the packer, and then a great many owners who were handling fruit said they would put their packer's name on, and then the law had to define that packer meant the owner. We also had another law punishing the real packer who did the work.

Q.—How long is the man responsible for the fruit after it is packed?

MR. CAREY: According to the way some of the fruit is kept in Toronto in warm cars, it gets partially decayed before it gets to the market, and it would not do to have the owner responsible very long. I think fruit that comes into the market to-day should be sold the next day. It should be put on the market within 48 hours.

MR. PRITCHARD: I have noticed with regard to peaches if the name is on the basket it is a guarantee that the peaches are all the same all the way through the basket. I have bought peaches where there was no name on the basket and found they were not as good in the middle as on the top.

Q.—What about the grade mark on open packages?

Mr. Carey: A great many of our growers, especially in Leamington, are putting a distinguishing mark on No. 1's and 2's, especially tomatoes and other fruits. I think it is a capital idea to grade your small fruits, because you are giving your fruit a distinctive name.

Q.—These open packages that are graded 1, 2 and 3 are not subject to inspection?

A.—No open packages are subject to inspection.

Mr. Clark: Should the address accompany the name when put on the package?

Mr. Carey: Yes, always.

Q.—Does the law say that the face of a package should be a fair sample of the contents?

A.—Yes, the face or shown surface must be a fair representation of the contents, and we must find 15 per cent. substantial waste in the body than the face before we can take action against the owner.

Q.—Do you have to take the top off to examine the open package?

A.—In the case of a basket, we often press down on the handle and then we can raise the lid of the basket sufficiently to just see if there is anything in there that would call for further inspection, and if we see anything that does not look right we then take off the lid. We do not care to tear open a basket of small fruit unless it is absolutely necessary. Our instructions are not to destroy fruit or use it badly. If a man's name is on the package we do not waste much time about it, because we know in that case it is generally all right. I think it would be in the interest of the fruit growers that the name of every grower should be on every package of fruit, because that will insure a better pack, and it will be fair to every grower.

Q.—Very often a co-operative company will sell a car load to outside points, is it necessary in that case to have the name of the grower on each individual package?

A.—Yes, that is absolutely necessary.

Q.—There have been a number of cases where car loads have been sold and the names not on the packages?

A.—I do not know that it is necessary to put the name on the open package.

Q.—What about the 11-quart basket?

A.—I am in favor of both the ordinary 11-quart basket and the deep eleven. I am in close touch with the trade and my opinion is that the size should be uniform.

Q.—I want to know the attitude of the inspectors with regard to a basket where you cannot put as many peaches in the bottom row as you can in the top row?

Mr. Carey: In my opinion, you can put the same number of peaches in each tier in this basket if the peaches are of good quality. I do not think there is much difference in size between the bottom of this basket and the top. We must find 50 per cent. smaller below, and where the flare is not too great, I believe this kind of basket is all right.

SHALL THE BLIGHT PREVENT US FROM PLANTING MORE PEARS?

W. F. W. Fisher, Burlington: The way I am going to answer this is by asking you a question, and my question is, "Is the blight worse now than it has been in previous years in this country?"

A Member: No.

Mr. Fisher: Is it generally worse than it has been for the last twenty years?

A Member: No.

Mr. Fisher: Then why is this question put on the paper? I have heard it said that no man was fool enough to plant a pear orchard a second time. Many people plant one pear orchard, but nobody plants two. I think a person may plant two of his object is such as Mr. Winslow stated yesterday. He said that people were in the fruit business to make a living, and I think if a man just wants to make a living he can still just plant pear trees and get a living of it very nicely. As far as I know the pear blight is no worse than it has been in former years.

Mr. Clark: Can the pear blight be controlled?

Mr. Fisher: No; I would say it cannot be controlled.

Q.—What do you mean by be controlled?

A.—Prevented, I suppose. It can never be prevented, but it can be controlled to a certain extent. Some years the blight is worse than others.

A Member: The blight is very much worse in our section of the country than it has been in many years, and we have had to cut down several big trees, root and branch.

Prof. Caesar: In two years time, we will have a report on the control of blight.

WHAT CONSTITUTES A NO. 2 APPLE?

D. Johnson, Fruit Commissioner for the Dominion of Canada, Ottawa.

In taking up the question of what constitutes a No. 2 apple, I am asked to discuss what is probably the most contentious question that will be discussed at this Convention. Since taking up the work of the Fruit Commissioner at Ottawa I have found it one of the most difficult things to establish so as to give satisfaction both to the consumer and the producer. We have found all kinds of opinions existing as to what constitutes a No. 2 apple. Some of our packers are so exceedingly conscientious that they are putting up a No. 2 apple just as good as others are putting up a No. 1. I am sorry to say there are other packers who are not quite so conscientious, and they are putting up apples which do not reflect credit on themselves or the district from which they are shipping.

The definition of No. 1 is very clear. We have no trouble in establishing the grade of No. 1. It is recognized both by the producer and consumer as being satisfactory. The law distinctly says No. 1 shall be 90 per cent. clear of defects. No. 2 is much less defined. The law says they shall be 80 per cent. clear of worm holes and scabs and such other defects as cause material waste, and around about that "material waste" the conflict rages. We find all kinds of difficulty in connection with that. Our instructions along that line have been as definite as we could make them. We have told our inspectors to go out among the people from orchard to orchard and packing house to packing house and up and down the concessions of the Province, meeting the people wherever opportunity afforded, and that they were to instruct them how to put up a good serviceable commercial pack of No. 2 apples that they believed would give satisfaction to the public and yet work no hardship upon the grower or dealer. Yet, we find the grade we have tried to establish is not exactly giving satisfaction to the dealers. We are told by them we are not strict enough; we are told by dealers and consumers when they purchase a barrel of No. 2 apples, they expect to have a barrel of apples that will last for a considerable length of time. They expect to have a barrel of apples that can be stored and used throughout the season. We have found in many places apples which were packed—and fairly well packed at the shipping point—have developed scab or fungus to such an extent that they were almost unsaleable at this time of year. Therefore, it is a very, very difficult problem just to say exactly what No. 2 apples should be.

We have been dealing with scab, and it is a contentious question. It is a violation only when they find it causes material waste. We have been trying to get the people to have their apples as clean as possible, because if there are scabs on such varieties as Greenings, Snows and Fameuse, they will develop a waste which will be very serious, and the dealers make very definite statements that there should be absolutely no scab allowed on No. 2 apples. And they say whenever we see a pack of No. 2's that is scabby we should immediately take action and prosecute that man and make him stop putting up No. 2 apples. Now, there is a great deal of truth in that, and yet we find in certain cases that it would work a hardship upon the packer to insist upon that, under all conditions. For instance, we have found apples of very fine quality, well matured, well colored and developed, and just a little scab—perhaps only as big as a pin head. It is rather a hardship on the producer to consign all these apples to No. 3 grade. I would like this Association to appoint a committee to go into this matter and try and form up some definite standard for the No. 2 grade.

A MEMBER: Why not cut out No. 3?

MR. JOHNSON: I am just going to deal with that. A great many of the No. 2 apples are, in my opinion, no better than No. 3. Perhaps two months ago when they were packed, they were a very good quality of apple, and there is where the difficulty comes in, and it is a very serious difficulty. We are exceedingly anxious to help the fruit growers in every possible way, and we do not want to work any hardship on them, nor do we want to work any hardship on the consumer. We have to stand between them. If we do not do what is right with the fruit growers they get after us and the consumers are always after us.

A MEMBER: Do you think we should assume responsibility for the apples after they are shipped?

MR. JOHNSON: That depends on circumstances. We always investigate very carefully before we prosecute anyone on No. 2 apples. Up to the present time this year we have had more prosecutions than we have had any year since the Act was introduced, even though we have tried to be as lenient as possible, but we have only had four prosecutions on No. 2's, and that is largely because the law is so indefinite.

I would like to have a committee of this Association appointed to go into that matter most thoroughly. You have here to-day some of the best and largest fruit growers and shippers in the Province, men who have to deal with these things, who have in fact to make their living out of fruit growing, and they are the men whom we want to get in contact with, and have their advice and then carry it out.

I might make a suggestion: it is only a suggestion, and I would ask you to discuss it here or have the committee discuss it. The suggestion is this, that No. 2 apples shall be practically the same as No. 1 apples, but lacking color. That is, No. 2 would be a colorless No. 1 and would be an apple that the householder could buy and put in his cellar and hold with the expectation of having apples that would be serviceable through the whole winter. The shipper can ship these apples to Europe or the uttermost parts of the earth with reasonable expectation that they would arrive there in the same condition as when shipped.

Then I would suggest that we have another grade, and call it No. 2A, if we are to have two grades of No. 2, or else define the No. 3. If we have a No. 2A it should be apples well matured and colored and well developed, but a little scab which could be defined. That would practically mean that we would have a pack of No. 2A which would be as good an apple as the ordinary No. 1, but with a little scab, and it would mean that these apples would have to go into consumption at an earlier date. They could not be stored for winter use, and it would not be wise to ship them to foreign countries, but the consumer would get an apple practically as good as No. 1 for immediate use. The commercial fruit men know that this year when they went out to pick apples they found many apples beautifully matured and splendid apples in every way, but just a little scab here and there. To put those apples in No. 3 grade was not right, because No. 3 in many cases was nothing less than rubbish. I can take you to the market and show you all kinds of No. 3 right down as small as crabs and covered with scabs—apples that are absolutely useless—and I say it is unfair to consign these fine, mature, well-developed apples with just a little scab, as ordinary No. 3 apples. Therefore, I would make the suggestion that we have a No. 2 which is practically the No. 1 without color.

Q.—What about the Snow?

A.—Without color they would be No. 2.

Q.—What about the size?

A.—I made the suggestion that they be practically the same as No. 1 only lacking in color; it is absolutely necessary that we define No. 3 or make two grades of No. 2.

Q.—What is your idea as to cutting out No. 3 entirely?

A.—That would work a great hardship in a year like this, because nearly all the apples are No. 3's in some places. My suggestion in regard to making two grades of No. 2 is that if you brand your apples No. 3, no matter how good quality they are, you will find difficulty in selling them by wire or by letter. For instance if you offer them in the Old Country or in the West and you said they were a fine quality of No. 3's, they immediately jump to the conclusion they are the ordinary No. 3, and they would not take them except at a very low price, but if you could wire and say you had a car of No. 2A, well-matured, practically No. 1, only a little scab, I believe you would get a much better price for them.

That is all I am going to say. I am going to leave the matter open so that you can appoint a committee, and I would like to meet that committee and thresh this matter out thoroughly. We feel that we must have your advice.

Mr. Elliott, Woodstock: When we get a well-matured apple that must be marked No. 2, I find it is pretty hard lines. Sometimes people would rather have a barrel containing two kinds of apples than only one kind, and sometimes they want half a barrel of Spies and half a barrel of Kings.

Mr. Johnson: That is not a very serious problem.

Mr. Elliott: I understand Mr. Johnson to say No. 2 would be almost equal in size as the No. 1. Will he go a step farther and have the No. 2 the same size as the No. 1?

Mr. Johnson: I would suggest that No. 2A be the same size. We very seldom find fault with the size unless apples are unreasonably small.

Mr. Carey: I visited a fruit house in Nova Scotia, and unfortunately they have a very large percentage of scabby apples there this year. They have a rule down there that works out very fairly; they are packing two grades of No. 3's, the first grade are such apples as Mr. Johnson speaks of—large apples often with good color as the No. 1's and affected somewhat with scab, sometimes the scab is no bigger than a pin head. They are marking these apples No. 3, and they are pasting a little slip on the barrel stating that the apples in this barrel are No. 1 in size, but on account of being affected with scab they have to mark them No. 3. No. 3 proper, down there, is any old thing at all. They have been doing this for two or three years, and the trade in the Old Country recognize the No. 3 bearing this label as a fairly good apple.

Q.—What would you call the balance of the apples?

A.—There would be many left that would be called No. 3's or culls.

Q.—Under the New York law they state what each box contains; if they are wind falls they must stamp that on the barrel. They have a lot of fancy grades, A and B, but in every case you must stamp what they are on the barrel.

Mr. Elliott: Would you advocate the packing of this stuff in packages irrespective of the evaporator man or the cider man or other men who might handle this by-product to better advantage than could be handled in barrels? I paid $3 a day to a man to pack apples this year and I put my own name on every barrel. If we are to use up the whole product in barrels or boxes I think it would be a mistake.

A Member: I do not see that we are going to get much further ahead in changing the grade; if you mark it A. B. and B. 2, that is no better than numbering it 1, 2 and 3.

Mr. Elliott: Would it be better to have just two grades?

A Member: I think from the lessons I have had this year I would prefer just No. 1 and 2.

Mr. Grierson: I think No. 2 grade might be improved on. If you try to govern it by scab you will find difficulty, each individual will have his idea, and the inspectors will have their idea, and then scab will develop in the barrels after they are packed. I think it would be much better to leave it as it is because now, if a packer puts up No. 3A grade, he can build up the trade for himself, and they will have confidence in his brand.

Mr. Bragg: It would be well to have a committee appointed to consider this question of a No. 2 apple as suggested by Mr. Johnson, and they could report tomorrow morning. The following committee was appointed: J. W. Clark, Cainsville; J. C. Harris, Ingersoll; C. W. Gurney, Paris; Senator Smith Winona; P. J. Carey, Toronto; W. H. Gibson, Newcastle; W. F. W. Fisher, Burlington; J. F. Elliott, Woodstock; W. J. Bragg, Bowmanville; W. H. Dempsey, Trenton; H. T. Foster, Burlington; Mr. Maycock, Winnipeg.

REPORT OF COMMITTEE ON GRADES OF APPLES.

Your committee beg to report: That the definition of fancy and number one qualities be left as they are at present.

That No. 2 grade be changed to read as follows:

No. 2 Quality.—Unless such fruit includes no culls, sound, of not less than nearly medium size, and of fair color for the variety, and not less than eighty-five per cent. free from scab, worm holes, bruises, and other defects, and properly packed.

In addition to that the suggestion of your committee is that a new grade, subject to inspection be made, called the "Domestic" and defined as follows:

Domestic.—Unless such fruit includes no culls, sound, of not less than nearly medium size, and fair color for the variety, ninety per cent. free from worm holes, but may be slightly affected by scab and other minor defects, and properly packed.

Mr. Gurney: I move the adoption of the report on the No. 2 and No. 3 apple grades, and that a committee be appointed to be at the call of the Dominion Fruit Commissioner. This is a matter that has to be submitted to the other provinces.

Dr. Grant: I have much pleasure in seconding Mr. Gurney's motion. We will be safe in leaving it in the hands of the Fruit Commissioner and the committee. This committee can be appointed by the chairman.

COMMITTEE TO CONFER WITH FRUIT COMMISSIONER ON CHANGES IN INSPECTION AND SALES ACT.

W. H. Gibson, W. H. Dempsey, C. W. Gurney, Dr. Grant, P. W. Hodgetts, W. F. W. Fisher, Elmer Lick.

MARKETING PRODUCE IN NEW YORK CITY.

H. A. Emerson, New York State Department of Foods and Markets.

Down in New York we have a great city to feed and it is my pleasure to represent on this trip to Ontario about 35,000,000 of people who are consumers. They are not all in New York City, but they are all within a radius of a few hundred miles of New York City. It is not a great producing country, but we produce part of the stuff we eat, and the great bulk of it must be shipped in. I come here asking that you put your product on our market, and I want to show you that we are strictly up-to-date in the producing business. We have been extremely wasteful in our farming business in the States, and I judge from what I have heard here that you people are extremely wasteful in not properly spraying your fruit.

The apple question that you are discussing here is one of the big questions with us. We are large producers of apples, and investigations showed that they were not selling for prices that justified the producer in producing the best; in fact, they were not selling at prices to encourage the producer to grow them at all. We investigated and found out that the consumer was paying an extremely high price, especially for fine fruit, and then we began to investigate to find out what was the trouble. A committee was appointed by Governor Dick four years ago, and it went into this subject very thoroughly. It was my pleasure at that time to furnish the questions that were to be asked of those that were being investigated along this line. After three months investigation it was found out that at that time the wastage in handling of fruit stuffs between the dock in the City of New York and the consumer amounted, at a very conservative estimate, to $120,000,000 annually. This $120,000,000 came out of the producers and the consumers in about equal parts. I am able to tell you to-day that the wastage between the docks in the great City of New York and the consumer in human food stuffs amounts to at least $200,000,000. Surely we are an extravagant people and a reckless people, and we need to check up in order to stop this waste or we will want, and the consumers in the great centres will be extremely sad if the producers do not continue to produce not only what they want, but a great deal more.

This committee of which I am chief deputy first went to the railway companies to find out what we could do with regard to a place to handle these food products.

The New York Central Railway turned over to us a pier, 1,500 feet along and 100 feet wide. The renting value of which would be $300,000 annually. This dock was just one block away from Washington Street, the great market street of New York. It was a very good beginning. Right alongside of this dock came the lighters with the cars on, and at the expense of the Railway Company these cars were discharged upon the pier. We opened auction rooms on the second floor of the pier and there we began selling not only apples but peaches as early as two in the morning. Now you might ask, "Why did the State interfere with business?" I will take just about two minutes to tell you why the State employed men four years ago to investigate this subject.

We found in our investigation that the apple dealers were shipping apples in there and the growers, who were large enough to pick and ship their own apples, were paying 5 per cent. and 10 per cent. commission to have them sold. We found the sales were usually carried on in whispers, that nobody knew what they were selling for, and then we found these receivers sold them to jobbers and they charged from 10 per cent. to 20 per cent. profit, and that they had to go through these jobbers to reach the grocer, who in turn sent them to the retail grocer. We also found many speculators in the deals and sometimes the apples passed through four and five hands at a profit for the speculators. We found we could have these apples sold at a much less price at auction, and then we asked the question, "Is the selling of fruit by auction a new business?" and the answer was "No, it is not." The Southern California Fruit Exchange, the largest and best organized and best equipped co-operative Association in the world, sells all their fruit by auction in New York City, and then we asked the question, "What does it cost?" and the answer was that they have a contract with the Connelly Fruit Company in New York to sell their fruit under the hammer and return exactly what they get for it for 1⅝ per cent. Consider that, 1⅝ per cent. against the amount you pay in order to sell your apples or any other fruit? 1⅝ per cent. against 28 per cent. and 50 per cent.? Is there any wonder that the middlemen are prosperous, and is there any wonder that there is anything left at all in the business for the grower?

I went to the State officials and said, "You give the people parcel post and a great many other things, and why should not you help them to get fruit?" They did not want to help us. They just gave us barely enough so that we could exist, but we could not travel around the country and look after the business in a proper way. So we went to the fruit auctioneers—one of the largest of the kind in the world—and we said to them, "What will you do for us? If we pay you 3 per cent. for selling this fruit for one year, will you handle it and charge up against the sales 5 per cent., and stamp thereon in plain black and white, so that the grower knows that we are charging 5 per cent., 2 per cent. of which goes to the State Commission?" The deal was made in a single day.

Then we went to work and we solicited fruit and there was a great hue and cry among the dealers that this was interfering with their business, and then they said, "We will go up in the State and buy all the fruit so that these fellows won't have any fruit to sell." All it takes to run an auction is to have something to sell and somebody to buy it. The auctioneer is purely and simply a hot-air merchant working in a good direction; so we took our hot-air merchant with us and in twenty-four hours we had a great combination auction sale in an orchard of 30,000 barrels, and a week later they heralded the fact to the world through the trade papers. Some of the papers would not take our advertisement. One large trade paper after making a contract with us verbally to put an advertisement in their paper, decided they would not do it, but other papers did. We do everything above board and we are handling $40,000,000 worth of fruit through one dealer, and not one dollar goes astray, and no shipper was ever defrauded out of a single cent through the public auction sales of fruit in New York.

Our watchword is economy and efficiency. We sell nearly all these apples in the country. The way they were doing before we went into the business was they were offering the growers $1.50 a barrel, and these men were going out in Oregon and Washington where they raise apples something like a painted woman—they look better than they taste. They were offering these people $1.50 to $2.00 a box for their apples, and they were offering our growers $1.50 a barrel in New York State for A. grade, but when these apples were put up at public sale the price was raised in New York City to $3.00 and $3.25 a barrel for these same apples. We sold one orchard near Syracuse for $3.40 a barrel, and that indicates that they must have been worth what they brought. These buyers had been going out through the State and buying the orchards with the apples on the tree and paying the farmers a very small price for them, and we decided we would like to sell some apples on the tree. You know it was our old friend Sam. Small who said, "It is the hit pup that yelps," and these people made a big complaint about our selling apples in that way, but we went on with the business and made a success of it.

Now, you might say, "What can you do for us?" And I will tell you what we are doing for the people in our State. We represent both the consumers, the producers and the growers, and we do the same for the people in any other State or country on the globe, as we do for the growers in our own State. There is no discrimination. What we want are more products, and we want quality. We are glad to hear these college men telling you how to raise better fruit, and we are glad to see many growers producing the best fruit, and we are glad to see that Mr. Commissioner Johnson is doing everything he can to educate you in the control of the leaf bugs and the moths and other pests that affect your fruit, but what is the use of all this education unless you will receive an income for your work that will justify you in following out the teaching that you receive? It all comes down to the fact that you have got to get the money.

What we want is more money returns to the apple grower. I am going to give you a little friendly advice. If you ship a car load of apples, ship the best you have, because you are shipping them to the biggest market in the world when you ship them to New York, and you are shipping them to the market that pays the most money. You are shipping them to a city where we have a lot of extremely rich people who can pay a big price for what they want. You want some of that money, and, therefore, you must ship the finest you have, and let word go out that Canada is shipping her finest apples, and we will sell them for 5 per cent. and sell them in open competition with all the fruit in the world.

In addition to that 5 per cent. there is a charge of 75c. for cataloguing.

We do not stop at the auction. We have arranged with retailers that we will advertise the fact that they will sell these apples at a certain percentage above what they pay for them at auction. James Pedlar said to us, "If you will advertise the fact you are handling these auction apples, I will sell them and stand the cartage at a profit of 17 per cent., and deliver them to the consumer." Now that puts you in the position that you are placing your apples in the consumer's hands for 22 per cent., and that is a much lower per cent. than anyone was able to reach the consumer with before. We had two big merchants who offered to do this, and after we had advertised the fact we had 3,000 merchants offering to do the same thing. We had no money invested in this; we had none to invest. The newspapers help us more than anything else. Our worst weakness is that we have not received the support of the producers of our own State who were so anxious to get away from the so-called middlemen, and who were so anxious to get directly in touch with the consumer. If the middleman comes up and pays the price they say, "We are not going to take any chance of shipping our goods to be sold by auction." There were 4,000,000 barrels of apples sold in New York City this year, and it is a conservative estimate when I tell you that the dealers, the buyers, paid $1.00 a barrel more for these 4,000,000 barrels of apples than they would have paid if there had been no Department of Foods and Markets in operation in our great city.

You are too far away to ship over-ripe goods to our market, and you are too far away to ship green fruit because green fruit kills your custom.

You people want to reach the best market in the world, and you want to get the highest price, and if you put your fruit on the New York market packed properly, and the best fruit you grow, you will get the highest price for it, not only your fruit but your potatoes or anything else that you grow.

The California Fruit Exchange is selling every dollar's worth of their fruit at auction, and they are getting it done cheaper and better than any other association in the world. They sell 80 to 100 car loads of California fruit in the space of about two hours. It is an open deal and that is the proper way to sell them.

As I told you before we sold an orchard out at $3.25 per barrel, and I said to the man, "What is this land worth?" and he said, "It is worth all I paid for it and more too; I paid $50,000 for these 55 acres," and we sold 14,000 barrels at $3.25. He had no complaint. It was a wonderful orchard; one of the best in the State. Up at Syracuse Mr. Hutchinson would not take $1,000 an acre for his land, and in other parts of the country they are asking $1,000 an acre, and in some places they will not take $1,000. What is the matter with the orchard land in this country? You have been keeping it all to yourselves and you have not been letting the world know what you have. The world does not know that you have such excellent flavored apples, and if you will put up your Northern Spies of an A1 quality, and put them up in an attractive way, they would go to the best people and they would bring the highest price, and they would be advertised all around the world and in a few years there would be a tremendous demand for these apples, because they have such a splendid flavor. If we have space we store the apples and advance a percentage on them, and they can be sold when the market is high.

Mr. Robertson: Whom would we ship our apples to?

Mr. Emerson: To the New York State Department of Foods and Markets, Room 708-9-10 Fruit Trade Building, 204 Franklin Street, New York. We would prefer to do business with you as an association, but as individuals we are glad to do business with you.

Q.—I understand that you have been shipping 100,000 barrels a week to the Old Country all through the season, and I was just wondering how it would pay us to ship to the United States and hope to make anything when you are shipping to the Old Country.

A.—The only way you can ship there and receive a benefit would be to ship quality—fruit that will bring the highest price.

Q.—You mean our fruit is of better quality than New York State?

A.—I believe the finest Spies I ever saw in my life came from Ontario; but not all the Spies in Ontario would come in that class.

NOTES ON THE SEASON'S SPRAYING.

Mr. L. Caesar: I do not know of anything new to add to what has been already mentioned from time to time, and what you will find in the Spray Calendar. I think the season's work throughout has justified us in every respect in advocating spraying. The question of spraying apples will come up again.

Mr. Armstrong: What has been the result of the use of soluable sulphur?

Mr. Caesar: I sprayed quite an orchard this year, as badly infested with the San José Scale as I could find in the neighborhood of Grimsby. A large number of the trees were thirty years of age. They were apple trees and were well pruned and well scraped. A large majority of them had passed any chance of being saved if they had been allowed to remain unsprayed this year. I used three different mixtures: lime sulphur, strength of one gallon diluted to seven of water, a specific gravity of 1.035; lime sulphur, specific gravity, 1.295. Then I used soluble sulphur, 12½ pounds to 40 gallons of water, and I used scalecide at the strength recommended by the company. They sent me a mixture to use. We used nothing but an old spray motor barrel pump. We put it into real good working condition and we sprayed very carefully. We put an average of eight gallons to every one of these well pruned trees and the result was that all three mixtures gave us perfect satisfaction. I examined the orchard in October.

Mr. Armstrong: Was there any difference in the cost?

A.—The cost differed very little, I have not figured it out. Two years before that I got the same result from lime sulphur and soluble sulphur, both had done their work well. I had hoped that we would have had some wet weather this year soon after spraying so that we could see whether soluble sulphur and lime sulphur would give equally good results in a wet season. I have been a little afraid that perhaps they would not. As for spraying later on the various tender fruits with soluble sulphur I have had no experience.

Q.—Would spraying have saved the balance of the grapes this season?

A.—That is very hard to say. I understand that the growers who did spray thoroughly, even in the case of their red grapes, had very little mildew. One would feel like saying that at any rate you would lessen the mildew to a very great extent. Spraying is peculiar in this way that you can never give a rule that will apply to every season. Fungous diseases depend upon weather conditions and weather conditions were different this year from what they have been. I should say that careful spraying would have saved the grapes that suffered from fungous diseases.

THE CO-OPERATIVE FRUIT GROWERS OF ONTARIO, LIMITED.

Elmer Lick, President, Whitby.

The task that I have before me this morning is rather a difficult one, in as much as before I get through it will be my duty to say some very, very plain things in connection with some of the fruit work in the Province of Ontario. I want to say at the outset that if I use any language which causes irritation, that I do it accidentally and without the slightest enmity to any person. I want it distinctly understood that while I shall hurry in some of the things I am saying, I shall possibly leave something a little unfinished, and had it been finished there would not be the same feeling.

The Co-operative Fruit Growers were organized for the simple reason of acting as a medium for the smaller associations handling their apples so as to furnish the market, particularly in the West, apples in the very best condition, and keep the market supplied year after year without the necessity of the dealer in the West coming down here and dickering. You all know what the idea was in the beginning, and you all know that it was desirable. You all agree with the theory of the matter, but when it comes to carrying out the theories there are a number of difficulties to overcome. We hear so very much about the Province of Nova Scotia, a section I have never visited, but I gather that the fruit section down there would be about equal from Toronto to Trenton. It would be quite an easy matter if that was the only section in Ontario handling fruit to get it into working order. We have our western section and our south-west section, and we have our north-west section and our east section. These sections all grow different varieties of apples and apples of different keeping qualities. It is essential that these apples from the west that are earlier should be got on the market at an early date and the keeping apples from the east and north at a later date.

There was a co-operative committee that worked step by step for a number of years overcoming difficulties, and finally we organized three years ago and went into business. We handled somewhere about 30,000 barrels three years ago. Owing to the difficulty of getting a manager a year ago I was forced into the business. We did not encourage large lots to come to us when other associations could find a market for them. As a result of the work we were able to do, there was not, I think, a single car that the associations wanted us to sell that we were not able to find a market for, and in nearly every case at very satisfactory prices. We learned early in the game that some of the associations that we expected to rely upon for one reason or another were unable to co-operate with us. We had some very hard experiences. We learned one thing that I know will not please everybody, and that is that, with very few exceptions, is it possible for the central association to work with local associations, where that local association was managed by a buyer and dealer in apples before he became manager of the local association. In corresponding with a man in Winnipeg the suggestion was made that that was the kind of man we should have to head our Association, I wrote back and told him to stop and think, and he wrote back and said after thinking it over that my contention was about right. We wanted to work up a trade that would stand on its own feet year after year. It is not the ambition of a local association to get the highest possible price out of the product, no matter what happens next year. We must understand that there is room for a large number of associations to be working outside of the central association, as long as they work with a fairly good understanding. I sometimes hope that the time will come when the bulk of the apples of Ontario will be controlled by a central organization. I do not think it would be a good idea to bring them together for next year's trade. That would be a big mistake. The business must be developed step by step. Because we have good orchards and grow good fruit does not mean that we can co-operate and make a big success; we must have the men. Apples cannot co-operate, neither can peaches. You must have men who believe away down in their hearts that what is best for them and their neighbours is best for the whole country. It is only as we develop men of the highest type that we can hope for the greatest success. One difficulty we have had is in dealing with associations that are not giving us all their product, they have sold their good stuff and used the central organization to get rid of their poor stuff. They must understand that there are rebates to be made and the rebates do not come out of the whole shipments but out of the individual shipment that was rebated.

The discussion on the box question on Wednesday afternoon delighted me. I know that there were men in the audience who were not in favor of the box. We realized early in the season that we had a lot of apples with a little scab on them and we determined that we would have to get some kind of a box to carry them in. We had a meeting with our directors at our rooms in the C.P.R. building and we discussed different boxes, and we finally decided on something after the style of this box. We said that cannot be taken as anything but an open package, and it will not cost more than 11c. or 12c. and the packing won't be difficult, and it was following exactly in line with what British Columbia had been doing. We didn't want to make the same mistakes that had been made in British Columbia, for we found out that they had three or four sizes. We came to the conclusion that we would use a brand, and call them "Consumers," and to distinguish between the contents of the boxes we branded them XX and XXX. If we had the slightest intimation from the Commissioner that he thought XX and XXX were going to mislead we would not have used them. It did not matter to us whether we used XXX or three stars, but we found out that somebody else was using three stars. We want to broaden this central work step by step, we want to put it in the best shape to help the fruit growers of this country to dispose of their apples. What are our plans? They are purely and simply to get good men to look after our interest and do the work in an efficient way. It will be five years next July since I took a trip to the West. I was only gone nineteen days. I got in touch with some of the men of the Grain Growers' Association, but they were not ready to go on with the business. The next year we had only about a thousand barrels of apples that we could ship out there. Step by step we have worked with all kinds of positions. We had one situation two years ago that almost crushed me. I thought we had landed one of the associations in the West at $2.05, the matter was discussed in this hotel, and one of the directors wanting the order for his own association, saying nothing to the rest of us, simply told them, as far as I can make out, that they could get the deal at $2, and they took it away from us. If we had had that order the co-operative association would have been in one of the best positions it could have been in in regard to selling. We would have had our foundation laid, but that slipped out of our fingers because a local association wanted the advantage of 5c. per barrel. If we had had the order at $2.05 they would have had a lot of their apples in that order at $1.95.

This last year we have not had a very big crop of apples to handle, I think perhaps 20,000 barrels, but we have in sight a large number of barrels to go to the West next year. If the plan works out it will mean that the apples will go from the co-operative association or from the grower at a charge of 25c. between the apples packed and landed in the hands of the co-operative association out there. When I tell you that last year I had correspondence with a firm in the West to handle our apples at about 15c. if we could look after our end for 10c., the rock on which we parted was that they wanted to know if they could get the majority of the stock in our company, and our answer was "Never." We are going to manage our own business. We are going to manage it from a Fruit Growers' standpoint, and we are not going to let any outside interest get control.

I realize that the problem before us is not a new one. My idea is that we should keep the Western market supplied with Ontario apples under conditions that will be satisfactory to them. If we cannot get higher prices we should take $1 less than we can get on the English market if that is necessary in order to hold the trade and in order that that section of the country that does not belong to Canada may be prevented from getting in there and getting all the trade. I trust that the result of the things I have said will be to help the fruit industry of Ontario.

A MEMBER: I would like to ask Mr. Lick what the meaning of XX is? We have to take the most of these things in the connection in which they have been used before the Fruit Marks Act came into operation.

MR. LICK: If you buy XXXX or XXXXX shingles you get a higher grade than XXX.

MR. GURNEY: The fruit men of the Cainsville district used boxes almost entirely this year, and they found it satisfactory in returns and in every other way. The worst difficulty with boxes is in loading them in cars on sidings where they do a lot of shunting. If you are on a siding where they won't shunt the car until you are through loading it is all right. The first thing in favor of the box is cheapness, we have to cut down the price between the producer and the consumer. The object of the Central Association is that there shall be only 25c. between the producer and consumer. We have negotiations to that end under way at the present time.

The remark was made yesterday that some boxes had gone to the West and somebody had put their foot in it. I would like that man to explain who it was. We put the brand plainly on the box. There is no deception in any shape or form in the use of that box. In packing these boxes we put them on the packing table and do not use any baskets, we put the apples directly into the box from the packing table. We give the box a little shake and nail one end on, and then put our elbow on and press it down and that is all there is to it. A good many take the apples in over night, they are easier to handle in boxes than in barrels. We all know that it takes a pretty good man to lift a barrel, but an ordinary man can lift a box with ease. We use a felt pad. It is a little expensive, but I am satisfied it is a benefit. I do not think it is necessary to have two hand-holds, I think the hand-hold at the top is the only one desired. I do not think the cleats are worth the bother. I do not find that they arrive in any better condition. The inside edge must be rounded if the box is to be used to any great extent. We have yet to receive the first bad report from the trade end. One dealer went so far as to say that he didn't believe there would be a barrel go into his city in seven years from now. We shipped Spies, slightly affected with spot, and he told me they went off like hot cakes. It is a partially closed package, but so is a basket. Mr. Carey said they pressed down the handle of the basket and looked in and if they find anything wrong they open it, and it is just as easy to open one of these boxes.

BETTER NET RETURNS FOR LOCAL ASSOCIATIONS.

A. J. GRANT, MANAGER THEDFORD FRUIT GROWERS' ASSOCIATION.

As fruit growers we are all vitally interested in money returns, and you will notice that I have chosen to speak to you on the subject of better "Net returns," and not simply better prices. There are many ways in which the members of associations as well as individuals can increase net returns, by decreasing many of the expense items in connection with the production and handling of apples. It is somewhat surprising how few members of local associations really understand the selling standards for apples, and yet the standards are the same as those governing the sale of any other commodity, viz.: Quality. Anybody can understand that a barrel or box of No. 1 apples will sell for more than the same quantity of No. 2 stock, or that a good Spy or Snow will sell higher than Bellefleur, but when it comes to the sale of a car-load or several car-loads, or perhaps the entire pack of an association, then we are liable to loose sight of the fact that it is the complexion of the entire lot of apples, from the standpoint of quality, which governs the price. Generally speaking, the greater the percentage of No. 1 red fruit and the fewer poor varieties, the greater the selling price per package. For instance, in the season of 1914, when low prices prevailed, I know a man who exported one car of very excellent Baldwins, making a net return of some $3.30 per barrel. This price was noised about the district, and nobody took the trouble to ask for the details of the sale, so that much dissatisfaction arose among the members of several associations because they did not receive at least $3.30 per barrel for their entire output, including varying quantities of inferior varieties as well as low percentages of No. 1 apples. This brings us to the first point that I would like to drive home. If you expect your managers to get you in on the top notch prices which you hear quoted from time to time, give them the necessary percentage of good No. 1 red fruit and a first-class variety list. These are the elements which make for high prices, and the packs with a low percentage of No. 1, with perhaps a lot of poor varieties, must accept lower prices, under the same market conditions.

Thorough pruning, intelligent cultivation and persistent spraying are the things which we must look to, if we wish to raise our percentage of No. 1 apples; the poor variety list must be assisted by liberal grafting to good commercial sorts. A great many growers are afflicted with inferior varieties in the orchard, and oftentimes none too freely blessed with quick selling varieties. Let us graft those kinds which are depreciating the sale of our pack and get at it quickly. When you improve your variety list you will improve your returns by no small margin. In our own association we found it such a difficult thing to get thorough pruning that we have started out a pruning gang to make a complete circuit of every orchard in the organization. If the grower wishes, we pay the pruning expenses and charge it up to next season's apples. You cannot talk good prices for apples from unpruned trees. Prune well first, then spray, as the season demands it, at least three or four times, and you have taken a big stride toward putting more money into your pocket at the end of the season. I cannot pass such a topic as spraying without emphasizing thoroughness and a sufficient number of applications. We take it for granted that all apply the three standard sprays, but there is a most critical period just after the apples are nicely formed, and lasting several weeks. If the weather at this time is damp and cool then get busy with the spray pump and you will be making money pretty fast. Drench your trees with abundance of good chemicals, and save money by anticipating your wants in spray material and ordering in sufficient quantity at the proper time to get in on the best price. The question of packages has already been pretty well discussed at this convention, and we can undoubtedly save some money by using a cheaper and more easily packed container for our lower grades.

In the producing of this good fruit which sells for more money, you have increased your returns in another way. You will all agree with me that it costs less money to grade and pack a good run of apples than it does to handle a poor run. We sometimes hear association members complaining about the cost of packing—here is the very place to lessen the cost by producing better apples. I have frequently noted, in our own packing-house, the remarkable difference between the time required to go through a good run of apples as compared to that required for apples which were grading low with a lot of culls. One of the best ways that I know of assuring yourself a ready market for your pack, at a good price, is to establish standards for your various grades (getting well in advance of the requirements of the Fruit Marks Act), and then guard these standards most zealously. One of the greatest shortcomings of the apple business is summed up right here. Most of us are too easily satisfied with the ideal apple for a particular grade. We have in mind simply what will pass inspection, and forget the really important thing—what the consumer is going to think about it after he has paid some real good money for the barrel or box of apples. Why is it that we can walk down the streets of Toronto and see such an abundance of high-class apples on sale which have been brought in from the Western United States and far away British Columbia? You will find the same conditions in other Ontario cities. The quantity imported is steadily increasing because there is a demand for a high-class, reliable apple, properly packed, and we fruit growers will persist in blinding ourselves to this big outstanding fact. What usually happens any line of business which refuses point-blank to supply what people are demanding? Why, of course, the business will have difficulties and mighty serious difficulties if a sane line of policy is not adopted. Our grading of apples, generally speaking, is much too low, and for this reason the trade demanding high class stock must seek its requirements elsewhere, thereby losing for us the cream of the business with the accompanying high prices. We have some progressive individual growers and some associations who have been packing high class grades and doing well in the industry. Why not every grower and association emulate the example of these few and bend every effort toward producing first class apples? Let every one of us broaden our sphere of vision as what is really a first class No. 1 apple and first class No. 2 apple. We have associations in Ontario who can always sell their pack at a good advance over the common herd. Why? Simply because they have established a reputation with the trade for a high class, uniform pack. Let every association try to establish standards of grading which will assure them a good reputation with the trade, and, when you are fortunate enough to win this reputation, guard it carefully as one of your best assets. One of the best ways to lose the reputation of a good pack is to become economical in the wrong direction, and employ some cheap, unreliable labor; you save a few dollars in the pay roll and lose many hundreds, as well as getting in wrong with the trade—a loss which cannot be estimated in money. There are two brands of economy, "Business Economy" or "Stopping Leaks" and "Foolish Economy." Let me commend you to the former as one of the key-stones of success in the apple business or any other business, but foolish economy is doing more right now to hold back fruit growers' associations than many other agencies combined. Commencing at your manager, who should have a thorough knowledge of business, down through the whole staff, we must have competent men. The ideal combination is "Brains" and "Energy," hard to get, but when you get such a staff, pay them first class wages and they will show results every time if the growers will give them the proper fruit to handle. They will bring your brand of apples to the surface so that you will be sure of a ready market at fair prices, regardless of overhead conditions. There is always a demand for the good article.

The market for apples is a very unstable one, and it is our business as growers to do all possible toward writing the word apples indelibly upon the want-list of every house-wife. How are we going to do this? First and foremost, give the consumer a run for his money by supplying him with good, reliable, uniform fruit at a reasonable price; pare your cost of production and overhead expenses to the lowest possible limit, but don't do it at the expense of quality or uniformity of grade. I would like to see every association using central packing-houses, as it is then possible to get uniform grading and keep to your standards. The central packing method is cheaper than the orchard pack, and it is much easier to get one good capable foreman who will stick to his grades than it is to get several foremen to handle orchard gangs; in the latter you cannot get the same uniformity, as you have too many individual opinions. A great deal can be accomplished along educational lines. Everybody is now clamoring for Northern Spy. We won't deny the fact that it is the best general purpose apple that we produce in it's season; but there are other apples of merit which we are producing in large quantities, the virtues of which are largely unknown to the public. Some excellent newspaper advertising had already been carried on with much benefit; the efforts of our energetic Dominion Fruit Commissioner in this direction have been highly appreciated by the fruit growers throughout the country, and we all hope to see this advertising continued. There is another method of educating the public, and that is through the legitimate fruit trade. There has been too much antagonism in the past between the fruit trade and the fruit growers. Such a state of affairs is not in the best interests of either party, and a better understanding all round would undoubtedly help the industry. We need the fruit jobber and the retailer and they need us. They can boost our wares to their own advantage as well as ours, but everybody concerned must have confidence in the "other fellow." Every retailer has his *clientele* of customers who look to him for advice in such matters; these men can do a great deal towards stimulating the demand for apples by recommending the proper variety for certain purposes, varieties in season, etc. Let us bury the hatchet and get closer together.

Many of our associations have another pernicious habit which undoubtedly reduces our net returns, and that is forcing upon the market of unseasonable varieties. Lack of storage facilities is a difficulty in many cases, but there is always storage to be had in the larger centres, and the holding of some of the later maturing varieties for even a few weeks may make a difference in the net returns to the grower on the season's business. I am not advising associations to go in for wholesale storage of apples, but I am advising that you offer the various varieties when the trade wants them. We growers are sometimes in such a hurry for our cheque at the close of the season that a sacrifice is made in order to turn all the apples into money.

The business of a fruit growers' association should be conducted upon sound business principles, keeping as free as possible from speculative ventures, but you will have your reverses, just the same as any other business. Learn to take such things cheerfully; you will have good seasons and you will have bad seasons, and I have repeatedly noticed that the fellow who is dodging in and out of associations always jumps the traces after a lean season and misses the good one to follow.

FRUIT MARKETING AND MARKETS IN WESTERN CANADA.

R. M. WINSLOW, PROVINCIAL HORTICULTURIST FOR BRITISH COLUMBIA.

MARKETING ORGANIZATION IN BRITISH COLUMBIA.—I am sure you will be gratified to learn that the Okanagan United Growers, Limited, which was established in the spring of 1913, has come through its third season of work most favorably and creditably. There seems every reason to believe that in the past season its management has been able to secure full market value for all produce shipped from the concern to the total value of considerably over $600,000, and has conducted this big business at reduced charges. The increase in efficiency of both the locals and the central has been marked; the cost of operating the central has not declined owing to the extra expense of salaried agents in the markets, but, this considered, both the central and locals have been operated at lower charges than previously.

In describing the O.U.G. as successful this year, I wish to be understood as saying that apparently the growers will have received better returns than through most other marketing methods. It seems entirely likely that in 1916 the O.U.G. will be much more generally supported than last year, when it handled about 55 per cent. of the Okanagan fruit shipments.

You will remember that the Legislature of British Columbia in 1913 passed an amendment to the Agricultural Associations Act under which co-operative marketing associations could, on paying up 20 per cent. of their subscribed capital, secure a loan from the Government up to 80 per cent. of their subscribed capital at a low rate of interest on a twenty year amortization plan. Under this plan the seven original locals of the O.U.G. secured $153,200 from the Provincial Government, on which sum, so far, payments of interest and principal have been promptly made.

On the whole, this plan of financing farmers' organizations seems to be a fairly satisfactory one. Its various deficiencies are being largely met in the revised Agricultural Association Act of 1915. This Act also provides for general agricultural credits handled under a commission to be appointed for the purpose. This Act is not yet in force, becoming effective by Order-in-Council.

The first important point I would make in connection with Government loans is the tendency of the growers to borrow too heavily. I should say that, roughly speaking, in the Okanagan Valley the extra overhead expense incurred by high capitalization has more than wiped out the expected advantage of capital at a low rate of interest and low annual repayments.

On the other hand, the growers have felt keenly their responsibility for the money borrowed. This has resulted in a much greater determination on the part of the growers to make each local a success. In the past there has been a strong tendency whenever an organization got in bad shape to throw up the whole thing and start fresh; such action often destroyed the good with the bad.

Under the present system the growers are working steadily to bring their present organizations to the highest possible business efficiency.

During 1915 the fruit growers of British Columbia were probably better organized than ever before; above 85 per cent. of the total shipments of fruit were marketed through organizations co-operative or otherwise controlled by the growers. To quite an extent these organizations were working in harmony, and quite a bit was done towards what is usually called the co-operation of selling agencies.

The raspberry carload shipping organizations in the Lower Mainland had a very satisfactory year, while the shipment of Vancouver Island strawberries in straight carloads by the Gordon Head Fruit Growers' Association brought most excellent results. These strawberries and raspberries were handled entirely through the Mutual Brokerages in Calgary and Regina.

An important step forward was taken by the Okanagan United Growers in establishing their own salaried agents in Vancouver, Calgary, Regina and Toronto, which had excellent results.

This extension has resulted in better marketing and in a much better understanding with the jobbing trade, and so has done much to lessen the growers antipathy to the wholesaler.

Despite all that has been done, however, in marketing organizations and in other lines including advertising, transportation, grading, packing, etc., returns to the British Columbia Fruit Growers in many lines have been and are very unsatisfactory. By faithful progress during the past five or six years our growers have gradually straightened out their business in all of these details. As each step was completed, there was general hope that it was the necessary one to make prices satisfactory. The attainment of practically all that is possible in each of these features of fruit growing and marketing has shown incontrovertibly that the trouble with our industry probably does not lie in any of these; our great trouble is the character of our American competition.

Imports of Fresh Fruits into Canada.—Importations of fresh fruits of kinds produced in large quantities commercially in Canada, constitutes one of our principal imports. I think the average fruit grower would be surprised to learn that the value, including duty, of imported blackberries, gooseberries, raspberries and strawberries in 1914 was over $800,000. Similarly imported cherries were valued at $142,000. In both 1913 and 1914 imported peaches were valued at nearly half a million dollars, while our annual importations of fresh plums were valued at from $300,000 to $350,000. Our importations of quince, apricots, pears and nectarines (lumped together in the Customs returns, but mainly pears), were valued at $441,000 in 1913 and over half a million in 1914.

I imagine that the grapes imported into Canada are largely of the European kinds grown either in California or Spain, but at any rate it might be noted that the importations in 1913 ran over half a million dollars and in 1914 nearly $650,000.

Most significant of all, the importation of apples in 1913 were valued at nearly $1,000,000, and in 1914 nearly $1,250,000.

The following table shows the quantities and value (including duty paid, but not including freight or distribution costs) imported in 1913 and 1914:—

—	1913		1914	
	Quantity.	Value includes duty but not freight.	Quantity.	Value includes duty but not freight.
		$ c,		$ c.
Blackberries. gooseberries, raspberries and strawberries	6,939,470 lbs.	712,789 00	7,104,745	816,955 80
Cherries........................	971,619 "	122,470 38	1,084,797	142,092 94
Currants	30,071 "	2,726 42	19,214	1,825 28
Peaches	14,579,147 "	476,390 33	12,137,209	474,854 50
Plums........................	151,650 bu,	313,074 80	123,531	353,619 10
Quinces, apricots, pears and nectarines........................	13,445,837 lbs,	441,601 90	11,040,871	502,137 51
Apples	320,325 bbls.	957,174 75	330,907 bbls.	1,236,664 80
Grapes, lbs........................	....	3,026,227 58	....	3,508,149 93
	6,247,521	505,743 29	7,712,447	644,326 24
	....	3,531,970 87	....	4,152,476 17

The consumers of Canada must in some way be aroused to the necessity of displacing these importations as largely as possible by Canadian fruit. With very many fruits it rests entirely with the consumer to stop this heavy flow of money out of Canada that should remain here for distribution among our own people. The Dominion Government Fruit Branch, the British Columbia Fruit Growers' Association and the British Columbia Department of Agriculture, working in co-operation, carried on a very extensive advertising campaign in the West last season, mainly directed towards educating consumers to demand Canadian fruit and especially British Columbia fruit. In preserving fruits they were urged to wait until the British Columbia supplies came on. In respect to apples, they were urged to look for the B.C. Brand on the box.

Important as the effect of such advertising must be in creating a preference for Canadian fruit, our experience for the past two years has shown conclusively that advertising is not at all likely to secure a higher selling price. Equal price and equal quality will induce the consumer to prefer Canadian fruit, but advertising would seem to have no prospects whatever in the way of inducing him to pay more for the home-grown article. That is the fallacy in the accepted view of fruit advertising. It stands to reason and is verified by experience that if our American competitors are selling any class of fruit—apples, for instance, at considerably less than the cost of production—no possible amount of advertising will induce the consumer to pay a fair price for Canadian fruit.

Imports of Apples into Canada.—Investigation of reports of the Department of Trade and Commerce, Ottawa, show that for the average of the years 1909 to 1914, have been imported annually over 185,000 barrels of apples. The importations for each year are shown as follows:—

Year.	Barrels.	Year.	Barrels.
1909	56,763	1912	195,069
1910	59,071	1913	320,325
1911	150,961	1914	330,907

Average, 185,516 barrels.

It is interesting to the Ontario apple grower that in at least two of these years, 1912 and 1914, large quantities of Ontario apples were not harvested at all.

It is further of interest to remember that British Columbia's production has steadily increased in this period so that these steadily increasing importations are displacing not British Columbia apples but Ontario apples. The British Columbia apple crop increased from about 200,000 boxes in 1909 to 800,000 in 1915. The underlying reason for the increase in imports is of the greatest interest to the Ontario fruit grower and will repay investigation.

Fruit Production in the United States.—Most of the apples imported into Canada come from the North Western States, the North Western box apple now constitutes nearly one-third of the consumption in the prairie Provinces. The key to the situation in the prairies is found in the conditions existing in the North Western States, and, with your permission, I will describe those conditions briefly in much the same words as those used by the executive of the British Columbia Fruit Growers' Association in their memorandum to the Economics and Development Commission.

Foreign Competition the Trouble.—Our great difficulty lies in the character of the American competition, from the State of Washington particularly. The North Western States have apples to supply the entire demand of our markets.

The approximate 1,000 carloads sent annually to Western Canada affect our outlets and distribution; but these imports, considerable as they are, do not even suggest the extent of the competition, or its character.

MARKETS DOMINATED BY AMERICAN QUOTATIONS.—Our markets are flooded, throughout the season, by the lowest American quotations going. It is practically unknown to make a sale of British Columbia apples until the buyer is fully satisfied he cannot possibly do better on foreign offers. We are compelled to meet, and often to go lower than the quotations of both the most incompetent and the most aggressive of North Western shippers. The American quotations absolutely set the market for British Columbia apples, and they are *the* dominating feature of that market.

COMPETITION MOST UNFAIR AND DESTRUCTIVE.—American competition is not ordinary competition. It is of a character that would not obtain in manufactured articles. It is competition of the most unfair and destructive character, and promises to continue so.

CONDITIONS IN APPLE DISTRICTS OF NORTH WESTERN STATES.—The North Western States have planted enough apples to supply their markets several times over. Their product has not, for years past, been sold to average the cost of production. The greater part of their orchards must be cut out. Of the 550,000 acres reported to have been planted, seventy-five per cent. or more must go under to enable the balance to survive. The growers are in bad shape financially, and most of them utterly discouraged; the majority have no hope of success. Liquidation is the order of the day. Mr. J. Howard Wright, now President of the Washington State Horticultural Society, in a recent address before that body said: " Sheriffs' sales, foreclosures and the like are the order of the day." Professor W. S. Thornber, Director of the Extension Department, Washington State College, at the North West Growers' Council in Spokane, said: " Ninety-five per cent. of the growers in one of the most successful valleys would gladly sell their holdings now for considerably less than they paid for them, and willingly lose their time and interest in the bargain." "If this then is the condition of one of the best valleys in the North West, what must we expect of some of the less favourable areas?" Professor Thornber then went on to state what was going to happen in the less favourable districts.

In four years ending 1915, the average selling price, according to their own authorities, has been more than 20c. a box below average cost of production.

COMPETITORS QUOTE AND SELL TO CANADA 40C. PER BOX BELOW COST.—They use Western Canada and similar agricultural sections in the United States to get rid of their low grade apples. Over eighty-five per cent. of their shipments to Canada are " C " grade, about equal to our No. 2. The average f.o.b. selling price of North West apples shipped to Canada in the past four years is under 70c. a box, showing a loss of nearly 40c. a box under average cost of production. It is under such conditions that we have marketed, and must continue to market ninety per cent. of our crop.

In 1914, many of the " C " grade apples shipped into Western Canada were forced on the market, on consignment, on a guarantee of 30c. a box. In 1915, a considerable percentage of the shipments were worm-stung or wormy apples, in bulk, at a nominal f.o.b. price of 45c. per 100 lbs., equal to 20c. a box.

In 1915, the average selling price of North West apples to Canada, was 80c. a box for " C " grade.

OUR COST OF PRODUCTION HIGHER THAN COMPETITORS.—Our cost of production is higher than in Washington and Oregon. For the last four years, our labour has averaged 10 to 20 per cent. higher than in Washington and Oregon, and the various materials entering into apple production—spray equipment and material, lumber, box materials, nails, fruit-paper, implements—cost us about 25 per cent. more. The cost per box in the four Northwest States is $1.0677, as averaged by Prof. Lewis (O.A.C. Bull. 134).

Conditions in 1916 Require Prompt Action.—The liquidation in the apple industry south of the line will continue for some time. Estimates are that they had about 48,000 acres in bearing in 1913, and will have 130,000 acres in 1916. If present plantings are moderately cared for, they will have in 1920 about 208,000 acres of trees six years old and over. This estimate requires that the balance of the 550,000 acres estimated to have been planted will be destroyed or so neglected as to be unproductive. Inevitably, the greater part of the orchards will be absolutely unremunerative.

The prospective crops for the next few years show that our competition will continue to be of a destructive character.

There is every reason to believe that the 1916 crop in the North Western States will be at least double the 1914 crop, or treble that of 1915; we are advised that the growers and their selling agents generally despair of successful marketing; that, in fact, the conditions of 1914, bad as they were, will be reproduced in greater intensity next year.

The destructive and unfair features of their competition in our markets in past years are likely to reach a new high record of consignment on minimum guarantees, or on no guarantee at all. We have much reason to fear the effects of exceedingly low returns on the British Columbia growers. We accordingly most strongly press on the attention of the Commission that it is of the greatest importance that early action be taken to adequately protect our legitimate markets.

The conditions as I have outlined them in the North Western States are of the most unsual character. There is no question whatever of fair competition. The free trade theory does not hold good under such unsual circumstances, because the free trade pre-supposes fair competition.

The Remedy.—In surveying the above conditions during the past five or six years and watching during that period the working out of the situation, we have in British Columbia come to a certain definite conclusion with regard to the competition of the North Western States.

The first is this: Their competition will be more or less permanently of an unfair character, because Western Canada now is a market for principally low-priced and consequently low grade apples.

North Western "C" grade apple supplies the bulk of the demand even under normal conditions of production; if the average of all their sales were equal to the cost of production, the selling price of "C" grade would be 15c. to 20c. below the average cost.

The second conclusion is that for the past four years, and for at least four years to come, the average selling price of North Western apples will be below cost of production, thus giving their competition a destructive as well as an unfair character.

To meet the difficulties of the situation and to tide over our British Columbia industry during the most difficult period between 1916 and 1920, our Association is urging on the Economics and Development Commission the absolute necessity of adequate and reasonable protection for our Canadian apples.

The Chairman of the Executive Commission has asked our Executive to propose adequate remedies, and in response to this request our Executive is recommending:

The amendment or interpretation of the anti-dumping clause of the Tariff Act so as to impose an adequate dumping duty on fruits imported at less than cost of production.

We urge that this action should be taken at once with a view to protection against a deluge in 1916.

We further are urging that as soon as it is practicable the tariff on apples be amended to provide for an import duty of approximately 35c. per box, which we would conclude from all our investigations to be just both to the consumer and producer.

Q.—What have you to say for using the crate with a low grade apple?

A.—That helps us about 12c. per box. The North West States are using the crate.

Q.—Have you any figures on the cost of production of a box of apples in British Columbia?

A.—Yes, we have quite a few figures, but nothing which I can consider as being absolutely representative. Professor Lewis, who is to Oregon what Professor Crow is to Ontario, has just completed a survey of the North West States. He issued a bulletin on the subject of "Economics of Apple Orchards," and he found in an average of a thousand orchards that the average cost of production of a box of apples was $1.06¾. British Columbia is young and our conditions are changing very rapidly, and it is very hard for us to say what is the cost of production. In 1915 the price of all box material dropped 25 per cent. and the cost of labour dropped 20 per cent. and 25 per cent. of our growers have gone to the war. The British Columbia Association has lost 200 members. Eighty-five per cent. of our fruit growers have enlisted. Over 50 per cent. of the men doing our orchard work have enlisted and our Oriental labourers are going back to China and Japan. Our labour situation may be fairly serious in 1916. We pay on cost of labour and material from 10 to 20 per cent. more than they do in Washington, on that basis we calculate that our cost of production of a box of apples is somewhere around $1.20 or $1.28.

Q.—You sell these apples in Toronto?

A.—Yes. When you consider that the North West States are shipping from 50 to 60 carloads of apples to Ontario you will acknowledge that the competition is keen.

MEMBERSHIP FEE.

Mr. Hodgetts: At a meeting of the directors a year ago a notice of motion was given that the Executive Committee move that the annual membership fee be doubled to members of affiliated associations, such motion to come before the next annual meeting as an amendment to the constitution.

The Chairman: This question was discussed last night by the directors, and Dr. Grant and Mr. Dewar were asked to present the matter before the meeting.

Dr. A. J. Grant: I am satisfied that there are not very many of you fully acquainted with the true state of affairs. If you were, some of you would have moved long ago to correct it. This is the time when we are trying to increase the profits of the fruit growers. If our Association ever had any justification for its existence it has double the justification at the present time. We are facing many difficulties that can only be righted through an organization of this kind. Up-to-date we have been doing business for the small fee of 25c. for membership. Last year we collected in fees some $309.10, and we expended twice that sum on periodicals that were sent to the members. "The Canadian Horticulturist" has a history behind it that should make it dear to the hearts of every member of the Ontario Fruit Growers' Association. There was a time when this paper was the official organ and was published by the Association. It got into difficulties, and it was impossible to continue it along that line. It was formed into a stock company and we have some $2,000 of stock in that company, and we have the right to supply each member with a copy for 50c. per year. I am satisfied that there is not a man in this room who will object to paying the 50c. each year as a membership fee.

We wished to go before the Government and ask for assistance by way of an additional grant. You can imagine a business man looking at our financial statement and seeing on one side $309.10 for membership fees and $728 for literature sent out to the members who pay that small fee. It is hardly a business state of affairs. I have much pleasure in moving that we raise the fee to 50c. to members who come in through affiliated associations.

Mr. Robert Stork: I have much pleasure in seconding that motion.

Mr. Dewar: I do not know that I can add very much to what Dr. Grant has said. It is not right that we should be trying to do business with less receipts than our expenditure. How long could any business man do business in that way?

The Chairman: There was a time when the Ontario Fruit Growers' Association did not have enough work ahead of it to use up all its grant. At present we need all our funds, and I am very much in favour of this motion.

The motion was put to the meeting and carried.

Mr. Hodgetts: The Dominion Government has recently appointed an Economic Commission to investigate all our troubles and remove them. The Secretary of that Commission has written to our Association and asked for a statement of our views on various matters in which they are interested.

Moved by Mr. Lick and seconded by Mr. Sheppard,

"That Dr. A. J. Grant, the Secretary, and Mr. Bunting, be a committee to answer the request of the Economic Commission." Carried.

SHIPPING OF IMMATURE FRUIT.

Fred Carpenter, Winona.

One of our main efforts in the past has been to increase the consumption and, in order to do so, we have been spending a great amount of money and a great deal of time through the medium of advertising, by the Government, by the Co-operative Association, and by dealers, and, in some cases, by individual growers. A great deal of money and time has been spent urging our transportation companies to give quicker transportation. Our fruit inspectors are trying to keep the fruit up to grade, so that the consumer will know what he is getting. All these things will work towards bigger consumption and enlarged markets. The question naturally arises, are we doing all we can to increase the consumption of fruit and enlarge the market? I say emphatically no. I believe that until such time as we have some means established in the tender fruit districts to regulate or prohibit the shipping of immature fruit, we cannot expect to get the greatest consumption. Take, for instance, the fruit grower as a consumer of fruit in his own case. When he wants some fruit for his own individual consumption, he goes out to the tree or the vine and he selects the fruit that he knows will satisfy his own taste; he does not do it indiscriminately. If he did he would likely get hold of some fruit such as often reaches the consumer, when one bite is sufficient.

As far as the consumer is concerned, he buys a basket of fruit that is immature. He is not able to judge from the outside appearance whether it is immature or not; he possibly thinks it is a specimen of the kind. It is a long time before he will go back to get another basket of that kind, and he tells his friends and neighbors, and he advertises the Ontario fruit grower in the wrong direction. When he starts to get fruit hungry again, he will possibly go to his dealer and he will still have in his memory the thought of his attempt to consume that Ontario basket of fruit, and if oranges or bananas will suit his fruit hunger just as well as apples, peaches or grapes or some other Ontario fruit, he will spend his money on the oranges or bananas. If, on the other hand, he gets a basket of fruit that is mature, he feels more physically fit after eating it, and it is not long before he goes back for another and yet another, and you will find in that case that same man will consume three or four times the quantity of fruit than he otherwise would.

I think you will all agree with me that this is a fair comparison. I could cite several instances which came to my attention not far removed from Niagara District, where there was no excuse at all for shipping immature fruit, and yet it was being shipped constantly. People on the Hamilton market frequently buy baskets of immature fruit and have it in the house for some days and hardly feel safe in going back to the Hamilton market for fear they would get something of a like nature. The question naturally arises, who is at fault? Is it the grower or dealer, or both? It was first a question with me, the last few seasons, as to whether the weather conditions or climate had so much to do with the immature fruit on the market as the price. To give an example, grapes, last season, were late, and the consumer in the West was asking for grapes. The dealer wired back to his shipper in the Niagara District, that there was a demand for grapes and guaranteed him a good price for grapes. The dealer advised the grower and offered him two or three cents more than it would be possible to get later in the season. I blame the grower for taking advantage of that offer and shipping grapes before they were ripe, but at the present time there is no law against doing that sort of thing. The grower is so busy that he cannot follow the dictates of his own conscience, and the grapes are shipped. Imagine the condition in the consumer's household when a basket of grapes such as that arrives—one taste is enough. Possibly one basket is enough for the season. I think the shipping of immature fruit is doing an immense amount of damage to the fruit growing industry, especially in the Niagara District. Practically all kinds of fruit are shipped immature, chiefly plums; and I can cite you examples, year after year, when Green Gage plums are high, they will arrive in three or four weeks before they are mature.

I can cite you another instance that I heard of last night about some growers who have made a practise for years of picking Lombard plums when absolutely green and shipping them during the Green Gage season. I do not say they were shipped for Green Gages, but they were shipped during the Green Gage season, and when it comes to the dealer and consumer, what does he know as to whether they are Green Gages or Lombards.

Campbell's Early grape is quite often shipped for Black Rogers. I know growers that make a large practice of picking their Black Rogers and putting them in as

Campbell's Early. I know of cases where they have left Campbell's Early on the vine until late in the season and then shipped them as Black Rogers. I am not in a position to suggest the remedy because I know there are men in the audience who are in a better position to speak with regard to that than I am.

A good live manager of a co-operative association who has the interest of the whole fruit growing industry at heart will not allow his members to ship immature fruit. I believe, if possible, some resolution should be enacted to either regulate or entirely prohibit the shipping of immature fruit. There is a possibility that if a law was passed with regard to it, even though it had seldom to be enforced, it might have a good effect on the grower and shipper. I find that something has been done in both Florida and California with regard to the regulation of shipping this class of fruit, and I am indebted to Prof. Crow for this information. In Florida this law has been in operation for some years.

In so far as bringing into effect a law in Ontario, it appears to me that a considerable amount of experimental work would first have to be done to determine the quantity of acid that could be allowed in shipping not only grapes, but other classes of fruit. Balling's Test is simply an acid test.

MR. FISHER: I think the shipping of immature fruit is a disadvantage to the grower and is very shortsighted on the part of any grower. As soon as these experiments have been made which Mr. Carpenter suggests, I think legislation would be in order.

MR. CLEMENT: In connection with the immaturity of fruit, especially grapes, we are endeavouring to test California grapes by Balling's Scale. Mr. Culverhouse has started something on that line. It will require at least three years of careful study of every variety before we can fix the standard. You have to test the grapes for sugar and acid in all stages of maturity. You have to test them in wet seasons and dry seasons, and fruit from a clay soil, sand soil and lime soil. It would mean a thousand determinations of acid and as many of sugar. I believe I wrote Mr. Johnson about it once.

MR. CULVERHOUSE: For my part, I would like to see the test carried out, even though it would take a great number of years, because when the standard was established, the carrying out of the law would be a simple matter.

MR. WINSLOW: Our climate is not good for grapes.

SENATOR SMITH: There is a great deal of difference in fruit as to its undesirability for shipping at maturity. With fruits that are going to be eaten out of the hand, such as grapes, it would be an exceedingly good thing if we could have some regulation, but there are other fruits, such as plums, that are not often eaten out of hand, that are chiefly used for cooking, and their maturity is not of so much importance. In fact, a plum, to make good jam, must be fairly green. If you are leaving it until it will be suitable for eating, it would not be good for jams at all. I would restrict the act to those fruits to be eaten out of hand. There is no question but what the shipping of immature fruits to be eaten out of hand reduces the consumption enormously.

RESOLUTIONS.

1. Resolved that in the death of the late Robert Thompson, of St. Catharines, past-president of this Association, we, the members of the O.F.G,A. Convention assembled, desire to express our deep sense of loss sustained, and to extend to the members of his family our sincere sympathy. Mr. Thompson's name during the last years had become a household word throughout the length and breadth of this Province, and his loss to the fruit industry is extremely great.

2. Resolved that the sudden and tragic death of the late Major A. E. Kimmins, while in the discharge of duty for King and Empire, on the fields of Flanders, has filled our hearts with deep sorrow, which, however, is not unmixed with a feeling of pride that a gentleman who was looked upon as always foremost in every movement for the advancement of the fruit industry, and every worthy cause in public and private life, was quite as ready to answer the call and relinquish life itself in the cause of freedom and humanity when occasion arose. In the long roll of the heroes of the Empire, the name of the late Major Kimmins will occupy an honoured place. To his bereaved family we tender our sincere sympathy.

3. Resolved that we desire to express to the Honourable Martin Burrell, Minister of Agriculture for the Dominion, our appreciation and grateful thanks for the assistance so freely furnished by his Department to the fruit industry of this Province, as well as the Dominion at large during the past year. The appointment of Mr. D. Johnson, as Fruit Commissioner, has fully justified itself. We wish to place on record our desire to co-operate with him in every movement which has for its object the placing of the fruit industry on a more solid footing by improving the quality of our product, by enlarging our markets, and thus extending our scope of influence.

4. Resolved that we tender to the Honourable James Duff, Minister of Agriculture for the Province, our thanks for his continued efforts on our behalf. The work of the Fruit Branch, under the able supervision of Mr. P. W. Hodgetts, our esteemed secretary, during the past year, has been extremely useful. The development of the fruit experiment station at Vineland, under the direction of Mr. F. M. Clement, has made marked progress. The spraying experiments conducted in various orchards throughout the Province have been valuable object lessons. The conscientious efforts of Mr. Caesar continued during the year to work out the life history of various fruit pests and secure effective and reliable means to overcome them have been very successful. We trust that all these agencies may be continued and extended during the coming year as far as possible. We congratulate the Honourable Minister on the generous contribution of Ontario apples which have been sent forward by his Department to our soldiers at the front.

5. Resolved that we consider the work of Mr. J. A. Ruddick, Cold Storage Commissioner, in his efforts to solve the problem of long distance shipments of our tender fruits, by means of extensive and continued experiments in the pre-cooling of fruit, to be extremely valuable. The results already obtained are of such a character that we trust these experiments will be continued during 1916 on an extended scale, if circumstances will permit.

6. Resolved that it is a source of regret that owing to the conditions brought on by the great war now raging it has not been possible to continue the Horticultural Exhibition which had attained such importance in the community. We trust that as soon as the war is brought to a successful conclusion and conditions become normal, that this exhibition may be revived on even a more extended scale.

7. Resolved that we desire to place on record our appreciation of the arduous work being accomplished by our transportation agent, Mr. Geo. E. McIntosh. We, in

a small degree, realize the opposition which he has to contend with. We believe that he is entitled to the support and co-operation of every member of this Association, and trust that his services may be continued during the coming year.

8. Resolved that we believe that if some comprehensive plan of advertising domestic fruits, and bringing before the public the desirability of a more extended use of them as a daily article of diet can be put into effect, it will have a very stimulating and satisfactory influence in extending the markets for the rapidly increasing volume of fruit produced in this Province.

9. Resolution presented by Fred. Carpenter, B.S.A., and Fred. A. Sheppard, "That the best interests of the Fruit Growers would be served if the Government would take some action regulating the shipping of immature fruit," meets with our hearty approval and we believe would have the unanimous support of the producers and consumers throughout the country in any such request that might be made to the Government.

10. The Special Committee appointed to consider the proposed tariff of the Railway Companies placing an additional charge for heated car service, recommend that the Association file, through their Transportation Agent, a protest against the proposed change of tariff, with the Railway Commission.

11. We are glad to note that the relations between the Railway Companies, Fruit Growers, and producers are on a fairly satisfactory basis, and trust that these various agencies which are necessary to each other, may continue to work in harmony and for the common good.

12. That whereas certain manufacturers of supplies used by fruit growers in Ontario are making use of recommendations obtained from eight to twelve years ago from Governments and fruit growers, and

Whereas the claims based in these recommendations are now void and misleading, owing to substitution of newer and better materials in some cases and the entry into the field of other manufacturers making supplies just as good in every respect,

Be it resolved, in the absence of special legislation covering such matters, fruit growers discriminate against such firms who persist in the advertising of their goods under such false representations.

Moved by Mr. Bunting, seconded by Dr. Grant, that the resolutions as read be adopted.

The meeting then adjourned.

ELEVENTH ANNUAL REPORT

OF THE

ONTARIO
Vegetable Growers' Association

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1916

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Toronto

To His Honour, Sir John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.

Lieutenant-Governor of the Province of Ontario.

May it Please Your Honour:

I herewith present for consideration of Your Honour the Annual Report of the Ontario Vegetable Growers' Association for 1915.

Respectfully Yours,

J. S. DUFF,

Minister of Agriculture.

Toronto, 1916.

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Ontario Vegetable Growers' Association

OFFICERS AND DIRECTORS, 1916

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Representative to Canadian National Exhibition: THOS. DELWORTH.

OTTAWA EXHIBIT BRANCH.
ONTARIO VEGETABLE GROWERS
ASSOCIATION.
DONATED TO ORPHANS HOMES OTTAWA
DIPLOMA
VEGETABLE GROWERS
ASSOCIATION
SPECIALS.

Ontario Vegetable Growers' Association

ELEVENTH ANNUAL CONVENTION.

This convention opened on Tuesday morning, November 9th, 1915, at nine o'clock, with the President, Mr. F. F. Reeves, of Humber Bay, in the chair. This was the largest convention yet held.

PRESIDENT'S ADDRESS.

F. F. Reeves, Humber Bay.

It is my privilege to convey to you in the name of the Ontario Vegetable Growers' Association a cordial and hearty welcome to this our eleventh convention. It was my proud distinction to have the honour to preside over the 1906 meeting. The remarkable progress which has been made in the lapse of nine years is far beyond our expectations. The Association has certainly achieved many important advances in the interests of vegetable growers, and it is to be hoped that in future there will be a steady march forward. It may be of interest to you to know that many of the vegetable growers in various States of the Union are as yet unorganized even in sections where immense quantities of vegetables are annually grown and marketed. It is a credit to Ontario vegetable growers that they have been organized for such a number of years.

The season which is now fast drawing to a close has been one of more or less anxiety for the vegetable growers. Extraordinary weather has caused many sleepless nights among us during the earlier part of the season. The heavy spring frosts caused considerable damage to early vegetables, particularly the tomato crop of the Leamington district. Continued wet weather from the second of July until the last week of August made it practically impossible to carry on the necessary operations of cultivation. Many gardens suffered severely from the continued drenchings of rain which have not been equalled in 25 years. However, a spirit of optimism is to be found in the vegetable growing fraternity. We are all thankful to have plenty to live on with a little to spare, and we are glad to know that over one million pounds of desiccated vegetables have been sent or are in course of preparation for the troops and sailors of the Allies.

The Association this year has carried on its work as usual. The field crop competitions were held and some excellent exhibits were made at Toronto, London and Ottawa Shows. We hope another year that some provision for instruction of the judges of the field crops similar to those given other field crop judges will be made by the Department of Agriculture.

Three new branches have been opened up this year and vegetable growers, the Province over, are gradually becoming more and more interested in the work of our Association.

We are grateful to the Minister of Agriculture for the keen interest which he and his staff have taken in our work. Among other things, the Minister has seen fit to place the President of your Association on the Advisory Board of the Jordan Harbour Experimental Station. It will be his duty and pleasure to bring before the other Directors any feature which may be considered worthy of consideration in the interests of vegetable growers of Ontario. Certainly, vegetable growers are receiving more and more attention from our Governmental Departments and the work done is fully appreciated by us.

Prices this season have been on an average 25 per cent. lower than in the past few years. Of course we must take into consideration the fact that money was plentiful in Canada, and, naturally, we vegetable growers experienced some effects of the boom which has passed over this Dominion in the last seven years. One thing the older members of this Association will agree with me is that prices have been considerably lower in the last 25 years than they are at present.

The seed market is somewhat unsettled owing principally to the wet weather which has been experienced in the seed growing centres of the United States. I am told by an authority that we may look for a scarcity of reliable seed of the following vegetables for next season—onions, spinach, beans and celery.

The labor question is one which should receive attention. So many men have enlisted or are employed in the making of munitions that it is a difficult matter for the vegetable growers to secure sufficient capable labor. Probably this will right itself only on the conclusion of hostilities in Europe, which we hope will not be far distant.

There are some features of vegetable growing which should be more fully brought before us, and one of these in particular is the question of shipping packages for vegetables. While this does not affect the growers in the immediate vicinity of large cities, it is becoming a grave problem for those who ship vegetables from other districts into the large markets of Montreal and Toronto. It would be a very beneficial work for this Association if some information could be gathered relating to the various vegetable packages used in Ontario. This would enable us to be prepared to standardize our shipping carriers.

Another point which I wish to bring before this Convention is that of devising some means whereby vegetable growers in the various sections of the Province may become informed as to the acreage and conditions of certain crops at various seasons of the year. Many of you have seen monthly circulars which are sent out by the Dominion Department of Agriculture which deal with the conditions of growth, demands and markets which relate to the fruit growers' interests. I am of opinion that some such report might possibly be worked out by our Association and prove of unqualified value in all the vegetable growing sections of the Province. Certainly the time has come when the vegetable growers of this Province must "get together" and become familiar with the varied ways and means of disposing of produce.

During the past year we witnessed two distinctly new features of advertising in Canada, particularly in Ontario. I refer to the great advertising campaign carried on by the Minister of Trade and Commerce advertising Canadian apples and Canadian fruit in general, and also to the lesser advertising which has been given to the fish of the Dominion of Canada. This advertising has informed the world that Canada leads in the production of fruit and fish.

Would it not be worthy of some effort to secure such advertising for Canadian vegetables? If vegetables were thoroughly brought before the reading public as these two products have been, Ontario growers might reap some benefit in the increased demand.

Another feature which I would like to mention before coming to a close is the action of some of our American brother vegetable growers who are gradually dumping more and more of their surplus on our Ontario markets. This past season has been particularly noted for this practice. Owing to the large crops of tomatoes and cabbage in the Southern States and the over glutting of their own markets, carloads of these vegetables were shipped to Buffalo and bought up at a very low price and shipped into our Ontario markets. Naturally the bottom fell out of your markets and our own early tomato and cabbage growers had to suffer. This would be a good line of work for the Ontario Vegetable Growers' Association to search into and try to remedy in the future.

Intensive cultivation. Celery 10 x 10 inches apart, with Skinner irrigation system overhead. Note the manure mulch.

In conclusion, we must admit that we are living in history-making times. Never before have Britain and her colonies been called on to fight a better fight for the laws of freedom and justice the world over. Canada has responded nobly to the call. She has opened her homes and given the best she had—her sons. She has given magnificently of her wealth, and the mother country realizes what a mighty support she has in this Canada of ours. Like all other classes of men, the vegetable growers have given their sons and of their wealth and are prepared to give even further in this great world struggle of right over might.

R. A. Hamilton: It might be well to look into that subject of the President's address, about finding out the number of acres that are grown under vegetables this year, and also about finding a market for the disposal of such product. I have no suggestions to offer in that way, but it would be a good thing for us to have.

F. F. Reeves: Some years ago we had crop reports from the different sections, and I have always been of the opinion that that would be a good work to bring up again, and I thought this was a good opportunity to bring it before the meeting. I have had during the past three months enquiries for vegetables of all kinds from practically all over Ontario. Now, if I had known where these could be bought, or if I could have given the names of the parties enquiring to the proper sources, it might in that way have been of benefit both to the growers and those who were trying to find out. I had no means of knowing, and it seems to me it would be well to bring that line of operation again into force in connection with our Association.

C. W. Baker: About that matter of advertising circulars which the President referred to, I think that that certainly is a splendid idea. If vegetable growers could devise some means of better advertising their vegetables, getting them before the people, and the idea that we are putting up the necessary good things that every householder needs, it would be a great advantage.

John Tizzard: The matter of American vegetables brought in here when our own stuff is on the market should certainly receive some attention. This is particularly the case in the spring of the year when we get carloads of stuff brought in here and we get almost nothing for our produce. The gardeners should get together and try to have some kind of a commission house, especially in a place like Toronto, so that they could distribute their stuff better than it is now distributed. At the present time the Toronto wholesaler buys the stuff for almost nothing from us and then sells it for a large price. If we could have a commission house that would give a better price for our stuff, it would be better for both consumer and producer.

J. J. Davis: I have often thought that if we had some sort of a clearing house at the leading centres in our business it would be a very great thing. But there are very great objections to be overcome in the running of it. We would need to run this house all the year round, and there are only certain seasons of the year when perhaps we would have any business, and meanwhile the expenses are going on just about the same. I have thought a great deal about that, but I have never been able to see yet just how we could work it and make it go. As to getting a commission man to handle our things and give us the larger part of the profit, I do not think we could do that, as no man is in the business for our benefit—he is in it for his own. If we had anything of that sort we would have to run it ourselves, and we are not in a position financially to undertake that.

Thos. Delworth: This matter of a clearing house has been discussed at different times, and it no doubt would work out to the advantage of the vegetable growers, but we have got to take hold of it in a large way. With regard to having a clearing house for our surplus product, as I see it, that would never be successful. Any man who takes hold of the work of running a clearing house would want the whole of our product. If we are only going to send to that man stuff when we have a surplus, do you see what he would be up against? He has got to handle it against a dead market. He wants the stuff when it is selling well, as well as when it is selling poorly, otherwise he cannot run any kind of a trade. Now, the only way I could see is this: We are all agreed that we could possibly get a better price for our stuff when only two or three men are selling in place of a hundred. The only trouble is whether our customers will be able to buy somewhere else and cut us out altogether. But I do not see that we can make a success of this by simply taking to this place the stuff that is a glut on the market.

JOHN TIZZARD: I believe the thing can be worked all right, provided you get hold of the right man to run it, and so far as taking all our stuff to one man, that I think would be almost impossible, but if we had a place where we could take the surplus of our stuff that is a glut on the market, it could be sold to places, such as hotels, boarding houses, etc., and if it worked out with one house it could be done with more, perhaps four or five in Toronto. How many men have we got here who come out and meet us at the Humber, who just get out again and sell it wholesale. They make a good business of that all the year round, and I do not see why we could not have one or more men to handle our stuff that way. I myself think it could be worked if we only got hold of the right man to do it and get him to stick it out.

REPORT OF SECRETARY TREASURER.

J. LOCKIE WILSON, TORONTO.

Nineteen fifteen will long be remembered by market gardeners and farmers as the year of, practically, continuous rains during the summer and early fall. The spring was dry, but, when once the heavens opened, the rain fell on the earth in quantity beyond measure, and rust, blight, rot and other kindred diseases attacked and, in many cases, ruined the crops of the farmers and vegetable growers. Had 1915 been an average year, the gardeners' crops would have been very heavy, too much so, perhaps, for satisfactory prices to have been realized. It is necessary, of course, that the farmer and vegetable grower should get a reasonable price for what he produces, as if he does not do that, he will say: "What is the use of all my hard work when it is not paid for?" So I say there is a possibility of producing too much stuff and getting too small a price for it, and discouragement will set in for the men who are endeavoring to keep up their side of this country's wealth.

During the year new Branches were organized as follows: Clinton and Louth, Lincoln and Welland, and St. Williams. The membership of the Association remains about the same. A condensed report of the work of the year as supplied to me by some of the Branches is given herewith. A letter is sent out to every secretary asking that a short report be given of the work of his society during the season. Unfortunately, some of our secretaries are either too busy or too tired to send in a short report. I think it is the duty of every Branch to at least tell us in a very few words what they have been doing during the year.

Blackwell.—This Branch has done good work this season, notwithstanding the lessened demand from the northern markets on account of the war and the closing of construction camps and similar works. In former years a very large percentage of vegetables and fruit raised by this branch was shipped by boat to the north. In spite of this the members have experienced a prosperous year. An exhibit of vegetables was made at Toronto and London and also at the Lambton County Fair. The wet weather proved a serious drawback, especially to the potato crop which blighted and the tubers rotted. Potatoes are selling now for 90 cents a bushel.

Brantford.—Meetings were held during the winter months, and one during the summer, when Mr. S. C. Johnston gave a demonstration on onion spraying for blight, from which much benefit was derived. Membership fee has been raised to $1.00 per annum. Members total 39. Sales of vegetables brought in nearly $1,200, or double that of 1914. No canvass is made for members, as this branch believes that demonstrating what can be done in co-operative buying is more effective than canvassing. Two cars of baskets, one of lime and several tons of sugar were purchased for members. Co-operative selling has also proved very satisfactory.

Clinton and Louth.—The Clinton and Louth Branch of the Ontario Vegetable Growers' Association held four meetings during the year. The first in March was an organization meeting, the second was addressed by F. C. Clement, of the Horticultural Experimental Station on "Potato Growing," and the last two in July and August were held at the Experimental Station where Mr. Clement and his assistants explained the various experiments being conducted, giving special attention to the Skinner System in growing vegetables and small fruits. These very interesting meetings were followed by discussions. Several entries in onions were made in the Field Crop Competition in which Mr. Eborall was successful in obtaining first prize in District No. 2, with a score of 95½ points.

London.—This Branch has a membership of 58. No special work was undertaken during 1915. During last winter an exhibition contest was carried on between two teams chosen from the members, and at the close of the contest the losers paid for a supper to the winners. This proved educational, as well as interesting members in the work.

Ottawa.—The work of the Ottawa Branch for the past year may be considered as a progressive one. New officers were installed: President, H. L. Bailie; Sec.-Treas., A. V. Main; and a board of six practical gardeners. Seven educational meetings were held during the winter months, which were wonderfully well attended, the lectures being topics of first interest to the vegetable producer such as "Melon Culture," "Tomato Growing," illustrated lecture on "Insects that are Destructive to the Market Gardener," "Potatoes," "Storage of Onions and Celery."

Following up our winter programme, we commenced in June our monthly visit on a Saturday afternoon to our fellow members' gardens. These summer outings are one of our strong lines of work, as seeing is believing, and we realize that we are never too old to learn. Our local Field Crop Contest was well worthy of being continued. It included 300 celery plants, 1,000 cauliflower, 100 square feet of onions, seeded or transplanted, 500 tomato plants, and 50 hills of melons. Points awarded were for market value, uniformity of crop, being true to type, freedom from diseases and pests, clean cultivation, and general appearance of crop. An entry fee of 25c. was charged for each crop. At the Central Canada

Fair, the Association offered $18 in prizes and R. B. Whyte generously added $7 to this, for vegetables. A splendid exhibit of vegetables and fruit was put up at the Fair, no less than four large loads, making the finest display of vegetables in the Province. As in former years this was handed over to the orphans' institutions of the city.

Grants were received from Gloucester, $25.00; Nepean, $20.00; South Hull, $10. Owing to financial conditions, the City of Ottawa did not contribute.

A day was set aside for an excursion in July, when the complex side of our business was dismissed. Our membership was 65. We issued a winter programme, and prize list. Receipts, $189.25, expenditure, $187.10. Considering conditions of war which are more or less affecting the whole universe, and climate conditions for 1915, the market gardener has had his share of prosperity.

Celery bleaching.

Our troubles and trials are a small affair (we, as Canadian producers of vegetables live in God's Paradise) in comparison with those intelligent gardeners of Europe whose homes and pet gardens are smashed into wreckage.

Sarnia.—This Branch has over 100 members, 200 carloads of vegetables were shipped and two cars of baskets, etc., purchased. Seeds and potatoes were obtained at wholesale rates. Several meetings held and great interest is taken by the members in the welfare of the Association. A number won first prizes in the Field Crop Competition. The outlook is bright for another successful year.

Stratford.—Plant boxes, baskets, seeds and other requirements for the members were purchased in bulk to good advantage.

St. Thomas.—This Branch bought their supplies co-operatively, and held several meetings during the year.

Tecumseh.—Tecumseh Branch has 131 members in good standing. Receipts amounted to $240.46, and expenditures to $157.34, leaving a balance on hand of $83.12.

Toronto.—Considering the very unfavorable outlook for market gardeners all over the Province, the Toronto Branch has every reason to be satisfied. In common with our brothers the Empire over, we have had to contend with depression in trade and a very unfavorable season climatically. Our business on the whole is in a far better shape than it was a year ago. We have held regular meetings every month. During the winter we met at the Labor Temple and in the summer at the homes of some of our members. At our April meeting we had our Annual Exhibition in Greenhouse Vegetables, watercress, parsley, mint, green onions, rhubarb, lettuce and radish. Good prizes were offered and the competition was very keen. We were favored at our March meeting by joining with Mr. S. C. Johnston in having one of the special conferences for vegetable growers held at Lambton Mills. The speakers, Messrs. Cook, David and representatives of greenhouse building firms proved very instructive and interesting. The attendance was upwards of 300. Our outdoor meetings during the summer months were very profitable. The presence of the ladies at these meetings was very gratifying.

Welland.—Had a fairly good year. Bought 3 carloads of fruit baskets, one of lime and one of spraying material at a considerable saving to the members. Also placed a fine exhibit of fruit and vegetables at the County Fair and donated it to the Daughters of the Empire for Red Cross Funds.

EXHIBITIONS AND COMPETITIONS.

The exhibits at the different exhibitions were larger than ever and of finer quality.

The Field Crop Competitions among vegetable growers are continuing to prove of interest to all occupied in the work of gardening. Four kinds of vegetables were selected, viz.: tomatoes, celery, onions and early potatoes. The five prize winners in the fields in each district were allowed to compete at the Canadian National and Central Canada Exhibitions and at the Western Fair, London. The Central Association arranged to have neat boxes prepared for the exhibitors. which were distributed to the different Branches in good time to have their products shipped to the fairs above mentioned. The packing of tomatoes in boxes of two layers with cardboard between and each tomato carefully wrapped was a marked improvement and the experiment will prove of value to our shippers.

I was present at the Canadian National and the Central Canada Exhibitions when the tomatoes were shipped in, and in the past years previous to 1915, the tomatoes came to those different fairs in very bad condition. The shipping in baskets seemed to be an absolute failure. I suppose the rough handling by express men and on the trains was largely accountable for this. At any rate 30 per cent. of those shipped to the Canadian National and to the Central Canada Fairs arrived in very bad condition. I cannot say about the Western Fair, Mr. Baker had charge of it last year and he will be able to tell you what the effect was in 1914. Mr. Whale, who had charge this year, will be able to tell you the change in conditions this year. I am quite confident that there is only one way of carrying on our shipping business and that is to do it right. There is just one way to do these, and there is not a bit of use dumping tomatoes roughly in the basket, as it only causes disappointment all around. A little extra pains on the other hand creates satisfaction.

The following are the prize winners:

CANADIAN NATIONAL EXHIBITION.

Celery:
1.—J. J. Davis, London, R.R. 7 .
2.—Wm. Elford, Humber Bay.
3.—W. R. Trott, London, R.R. 7.
4.—J. Harris & Son, Belleville.
5.—Art. Carlton, Lambton Mills.
6.—F. F. Reeves, Humber Bay.
7.—Cooke Bros., Cataraqui.

Tomatoes:
1.—J. Harris & Son, Belleville.
2.—Charles Aymer, Humber Bay.
3.—C. H. Aymer, Jr., Humber Bay.
4.—G. W. Bycroft, London, R.R. 7.
5.—John Tizzard, Humber Bay.
6.—Victor Robinet, Tecumseh.
7.—W. Trick, Ottawa.

Onions:
1.—Edward Worgan, Weston.
2.—Charles Aymer, Humber Bay.
3.—J. Tizzard, Humber Bay.
4.—George Riley, Aylmer, Que.
5.—W. I. Eborall, Beamsville, R.R. 1.
6.—W. E. Crandall, Ingersoll.
7.—Chris. Dent, Sarnia, R.R. 1.

Potatoes:
1.—F. Gard, London, R.R. 7.
2.—W. R. Trott, London, R.R. 7.
3.—H. Hachborn, Brantford, R.R. 5.
4.—F. F. Reeves, Humber Bay.
5.—Hy. Broughton, Sarnia, R.R. 1.
6.—James Dandridge Humber Bay.
7.—Sanderson Bros., London, R. R. 7.

WESTERN FAIR, LONDON.

Potatoes:
1.—Fred. Gard, London, R.R. 7.
2.—F. F. Reeves, Humber Bay.
3.—B. Lancaster, Cataraqui, R.R. 1.
4.—W. A. Thrasher, Sarnia.
5.—Murray Smith, Sarnia, R.R. 1.

Celery:
1.— J. J. Davis, London, R.R. 7.
2.—F. F. Reeves, Humber Bay.
3.—W. R. Trott, London West.
4.—Sanderson Bros., London, R.R. 7.
5.—F. M. Mulligan, Harbord.

Tomatoes:
1.—Charles Aymer, Humber Bay.
2.—Charles H. Aymer, Jr., Humber Bay.
3.—George Bycroft, London, R.R. 7.
4.—John Harris & Son, Belleville.
5.—D. Dempsey, Stratford.

Onions:
1.—Charles Aymer, Humber Bay.
2.—George Riley, Aylmer, Que.
3.—R. Hachborn, Brantford.
4.—J. Tizzard, Humber Bay.
5.—Cooke Bros., Cataraqui.

CENTRAL CANADA EXHIBITION, OTTAWA.

Celery:
1.—J. Harris & Son, Belleville.
2.—W. Trick, Ottawa.
3.—F. F. Reeves, Humber Bay.
4.—W. R. Trott, London, R.R. 7.
5.—T. M. Mulligan, Harbord.
6.—P. T. Jean, London, R.R. 8.
7.—J. J. Davis, London.

Tomatoes:
1.—Charles Aymer, Humber Bay.
2.—Chas. H. Aymer, Jr., Humber Bay.
3.—G. W. Bycroft, London, R.R. 7.
4.—W. Trick, Ottawa.
5.—J. Harris & Son, Belleville.
6.—W. H. Stewart, Aylmer, Que.
7.—D. Dempsey, Stratford.

Potatoes:
1.—Thos. Delworth, Weston.
2.—H. Hachborn, Brantford.
3.—F. F. Reeves, Humber Bay.
4.—James Dandridge, Humber Bay.
5.—Sanderson Bros., Sarnia.
6.—Robert Plunkett, Weston.
7.—W. R. Trott, London.

Onions:
1.—Charles Aymer Humber Bay.
2.—George Riley, Aylmer, Que.
3.—W. I. Eborall, Beamsville, R.R. 1.
4.—W. E. Crandall, Ingersoll.
5.—J. Harris & Son, Belleville.
6.—H. Coldrey, Ottawa.
7.—Edgar Worgan.

It is a pity that any of our Branches should be too busy to enter into the Field Crop Competitions, which is perhaps one of the most important lines of work gone into by our Association. It has a broadening effect upon the members, putting up their skill against that of other districts, and the competition is usually very keen. Then the opportunity is given for those five prize winners in each competition to enter for the prizes in the three great Exhibitions in this Province—the Canadian National, the Central Canada and the Western.

Our Directors, knowing that this was a time of stress, financial and otherwise, deemed it advisable to curtail as much as possible the expenditure, and while there has been some slackening up in the efforts of our members, this is due solely to the war conditions. A large number of the stalwart sons of our members are now fighting in the trenches at the front. I wish to express our sympathy with our President, whose gallant son was wounded on the battlefield in France, and the only son of one of our past Presidents and a member of the Executive, Mr. Thomas Delworth, is now following in the steps of the son of his neighbor in the fight for freedom's righteous cause.

Tomatoes well staked. Stakes are 6 feet long and 1 inch square.

Time will not permit me to name the scores of others of our members who have been large producers of foodstuff, who at duty's call have depleted the ranks of our farmers and are now doing valiant work in another field of endeavor for their country.

The judges sent out for Field Crop work have on the whole been satisfactory, but I would suggest that, if it can be arranged, we have a short course for judges for the vegetable competitions the same as is now done for judges for the other field crops. It is of vital importance that there be uniformity of judging by score cards, if the best results are to be obtained. This is a matter that I should like discussed by the delegates at this Convention.

With the other forward movements of the Association investigation into co-operation has practically been allowed to stand still till the war is over.

A number of our members have experimented with growing of seed, but have not yet reported to the Central Association. Scarcity of farm laborers still continues to be a serious drawback to gardeners, particularly as so many of our men, as stated above, have gone to the front. Complaint is made continually that while there are so many unemployed men in our towns and cities, those who go out to assist the farmers seem to tire quickly of country life, and, in many instances, have returned to the city three or four days after leaving it. Scores of others absolutely refuse to engage as agricultural laborers.

We are looking forward to a large increase in the number of our members in 1916, and hope to be able to send out experts to address the members of the different Branches. Our work will, of course, largely depend on the duration of the war and the financial conditions resulting therefrom.

It is the bounden duty of those of us who remain at home to do our part in increasing the products of the soil and making every possible sacrifice so that victory may perch on the banners of the men who are fighting for King and Country.

FINANCIAL STATEMENT.

November 30th, 1914 to November 30th, 1915.

RECEIPTS.

Balance on hand from 1914	$266 88	
Grant	800 00	
Membership fees	95 60	
Entry fees for Field Crop Competition	172 00	
		$1,334 48

EXPENDITURE.

Stationery	$9 75	
Postage	10 00	
Expenses of delegates to American Vegetable Growers' Convention, Cleveland	25 40	
Auditing	5 00	
Prizes paid in Field Crop Competition	350 00	
Expenses of Directors attending Annual Convention	95 55	
Expenses attending Directors' Meetings	94 95	
Executive Meetings, services and expenses	114 00	
Stenographic services	15 00	
Expenses *re* London Exhibit, 1914	24 78	
Badges for Convention	14 00	
Cut	2 00	
Printing Constitutions	14 00	
Boxes for Vegetable Exhibits	22 05	
E. Longstaffe, Luncheon for Convention delegates	14 70	
Balance on hand	523 30	
		$1,334 48

F. F. REEVES: We have all been greatly interested in the Secretary-Treasurer's report. We all know he could not do otherwise than give us a good one. I am very glad to say that the boy who got wounded at St. Julien is once more fit for light duties, and I now have another lad in the ranks, and if the Almighty should will it and the Germans are good enough shots to put him out of the firing line, I have another one or two to take his place.

There is just one word I would like to say in regard to the tomato packing. The box is a great improvement over the old basket system.

R. A. Hamilton: In the matter of reports from the different Secretaries, while I am secretary of the Haldimand County Association, it was impossible for me from the time I received notice to make out the report. A special meeting was called for, and when we arrived in Dunnville, the building in which we hold our meetings had been fumigated on account of smallpox, and owing to that, there has not been anything doing since, and the report that I might give to you might take up too much time. The number of members of our Association are only 28, but last year we got quite a few new members. I am in sympathy with the Field Crop Competitions. They are one of the best things the Association has started, and I find it is one of the best things for the development of vegetable growing for communities to have these competitions.

C. W. Baker: In connection with the Field Crop Competition, I certainly felt very envious of Mr. Whale, who put up such a nice exhibit this year. I happened to be in charge of an exhibit just next to him, and people took a second look at his because those tomatoes were so nicely put up in those flats. Our secretary from London did not send in a very extensive report. We had an outdoor gathering inspecting greenhouses of Mr. Sanderson, Mr. Davis and Mr. Bycroft, who all live closely together. The gathering was a huge success, about 100 of the members and their wives being present. Just about that time the President of our London Branch enlisted and is now at the front, as well as several members—one of them has three sons at the front.

Thomas Delworth: Mr. Wilson's suggestion that we have Short Courses for the Vegetable Judges as for other crops is a very good one. In regard to the judges for stock, the class is addressed by men standing high in the different lines of stock. I can quite see how men who have attended a class of that kind will not make such mistakes as a man who goes to judge without such knowledge. We have been getting on very well with our Field Crop work, but we don't claim to be perfect. Some men will, for instance, judge a crop of onions and give 75 or 80 points for the absence of weeds, another man feels, as long as there is a good big crop with lots of money coming out of it, that is the main point. It is necessary for these men to meet and spend a day or two in a class and arrive at uniform ideas in regard to judging.

R. Dengate: With regard to Field Crop Competitions, while I might perhaps not be able to win a prize, I think that every member that puts in entries for a Field Crop Competition should be allowed to compete at the Exhibitions in the large centres, but not be forced to do so. While a man might not be able to win in the garden, he might be able to win at either one of the fairs. Last year my onions got blighted, my potatoes got frozen, and my celery was drowned, so I was out of it.

J. Lockie Wilson: When we started the Field Crop Competitions in vegetable growing, it was as an experiment. I am glad Mr. Dengate brought this matter up. In order that our exhibits might be respectable looking, we put in our regulations that the five prize winners in each section would be compelled to compete at London, Ottawa and Toronto. Now that was all right in the initial stages of our work, but from practical experience we have found that it is not going to work out much longer, for the simple reason that a man may take a 3rd, 4th or 5th prize in his district and that crop be a very inferior one, and yet he is obliged to send a sample of that crop of his to the larger Exhibitions. I think Mr. Dengate is right. We will have to throw off our swaddling clothes, and say that any man who competes may exhibit at these larger fairs, and drop out the compulsion. Because after all a man does not care, if it is a reasonably poor crop he has got, even though he may get a local prize, to bring that down to the larger fairs. The time has come when we should drop these bars and allow a man to compete at the big exhibitions if he feels that his stuff is worthy. This is a matter for discussion.

PROF. MACOUN: Representing the Ottawa Society, I was given two or three points which the members wished brought before the Association. This is one of them—that every member shall have the opportunity of exhibiting at the Exhibition if he cared to do so. I do not know whether that would meet with your approval or not.

Vegetable Experimental Plots, C.E.F., Ottawa.

J. LOCKIE WILSON: We pay the express charges on those tomatoes, celery, and onions to those different fairs, and I am afraid it would cost too much if we allowed everyone to compete, but we might try the plan of letting each competitor have the opportunity.

PROF. MACOUN: The next item is that the Ottawa Association would like a change allowing transplanted onions for the Ottawa District. The season is rather short, and in some seasons the onions grown from seed have not a very good chance, and they thought if there was an alternative so that both seed and transplanted onions could be included, it would help them out a great deal.

F. F. REEVES: I was very glad to hear the suggestion of both Mr. Dengate and Prof. Macoun. Prof. Macoun talks about it being difficult to grow seed-grown onions at Ottawa, but I saw the best crop of seed onions there that I could find anywhere in Ontario. I think if instead of every member, every competitor was allowed to compete, it would be a better idea.

JNO. TIZZARD: I think compelling every one to send their stuff to these different fairs should be eliminated. Two or three years ago I got a prize for celery, but when I came to send it away to the fair I had not a head of celery in the whole patch fit for exhibition. This year I had one of the best patches of celery and I got no chance at all to exhibit, and if I had done so, there are few who could have competed with me for celery.

J. J. DAVIS: It would be all right to let every member compete, and if the number gets too large, we will have to let them pay their own express charges on their own goods. If a man thinks he has fine goods, he should not mind paying his express bill. If I thought my stuff was good enough to exhibit, I would not mind paying the transportation on it. But of course to be compelled to show whether I had good stuff or not, may cause a great deal of embarrassment, particularly in celery. Sometimes a man will have a good crop in the pink of condition when it is judged in the field, but, perhaps, by fair time, a blight might have come along and he might not be able to get a good showing of celery. I would limit it to competitors, simply to encourage people to compete. It is very hard in some districts to get people to compete.

W. MCMEANS: Celery and onions should be judged when they are coming on to maturity. That is when celery is at its best and when a man gets the money out of it; it should be judged a week or two before these Exhibitions come up.

J. LOCKIE WILSON: As our funds are getting a little limited, and these Field Crop Competitions are growing, I was wondering if this proposition would be all right, that the express charges on the goods of the five prize winners would be paid, but any competitor could enter by paying the express on his own goods. You can see that, if there was a good crop in the Province, we have about 800 or 1,000 members who might be inclined to enter the competitions and exhibit, so it is doubtful if that proposition would be workable.

R. DENGATE: Let the prize winners pay their own. They are getting the most out of it.

THOS. DELWORTH: The suggestion that has been made to allow all competitors in the Field Crop Competitions to compete also at the Central Exhibitions is the better recommendation, one reason being, as Mr. Davis suggested, that it would tend to get more competitors in the Field Crop Competitions. With regard to paying express charges on the products of one man and not on that of the other, thus making two classes, this would create confusion and lead to dissatisfaction, and we should allow any man who enters as competitor in the Field Crop Competition to enter under the same terms as they are entering now. You will not find the expenses very large, because, in every competition, we have four or five prizes and there are only ten competitors. Some had eighteen, of course, but the whole eighteen did not compete. I have entered crops myself which looked very good within a week of the time that the judge came there. Blight came about a week after the judge was there, and of course destroyed the crop. This year the blight came about a week before the judge came.

J. W. RUSH: The idea of Mr. Dengate is all right, to allow anyone who would enter the Field Crop Competition to show, those who cultivate their stuff to the best of their ability and you know they can only do their part and have to depend on higher powers for the results.

REPORT OF DELEGATE TO AMERICAN VEGETABLE GROWERS' CONVENTION, CLEVELAND.

F. F. Reeves, Humber Bay.

It was my privilege to be once more your representative at the Eighth Annual Convention of the Vegetable Growers' Association of America, held at Cleveland, Ohio, September 7th, 8th and 9th.

All the meetings were peculiarly interesting, the Cleveland Branch being organized seven years ago. The Cleveland Vegetable Growers whose hospitality is boundless, gave all the members a most hearty welcome.

By the reports of the Secretary and Treasurer the Association is in a very satisfactory condition, both numerically and financially. The original roll consisted of representatives of ten States: there are now thirty-five States and Provinces in the United States and Canada represented in its membership.

The attendance was very large (upwards of 400) especially when one considers that the conditions of vegetable growing have been unfavorable in nearly all sections of the country this last season. A particularly noticeable feature of the Convention was the large attendance of ladies at all the meetings.

The morning session of Tuesday, the 7th, was taken up with welcome addresses by Mr. Cooley on behalf of the Mayor of Cleveland, and Mr. John Cunningham for the Cleveland Vegetable Growers' Association, and receiving the reports of the Secretary and Treasurer.

In the afternoon an inspection trip was made to the Rocky River Greenhouse District, visiting the following farms: West Park Greenhouse Co., Rocky River Greenhouse Co., Western Reserve Greenhouse Co., Goldwood Greenhouse Co., and C. C. Christian Gardens.

The greenhouses on all these plants are very large, and contained lettuce and cucumbers in all stages from plants just set out, to plants that had been in bearing since June.

There were two inspection trips and on both of them visitors boarded street cars at the hotel which carried them as near as possible to the gardening district, where they were met by automobiles, upwards of 100 being provided by the Cleveland Growers for that purpose.

Wednesday morning session was taken up with a round table discussion on marketing problems, led by Mr. H. W. Selby, of Philadelphia; a great number of the members took part in the discussion which was largely on wholesale distribution, only one member, Mr. Foote, Cleveland, speaking on the retail side of the question.

Mr. Tiebout, of Louisiana, spoke particularly on cauliflower production. He said it had been proved that cauliflower can be grown successfully as a winter crop in that state to be marketed in December, January and February. All the growers in this state belong to one organization, whose manager markets the entire crop. Central packing houses are established in different districts. This Association purchased 375 lbs. of cauliflower seed in Denmark last year.

The advantages of advertising our products was also brought up. As a means of increasing consumption of our products, it was suggested that the growers advertise in the daily papers, when a full supply of a certain crop, say, tomatoes, would be on the market, and suggest that purchases be made for home canning.

The importance of close grading and careful packing was especially emphasized, the whole discussion was summed up in a few words by the Chairman, Mr. Selby, who urged that the time has come "to put co-operation into operation."

In the afternoon there was an inspection trip through the Shaaf Road Gardening District, Brooklyn. Among those visited were Mr. C. M. Hinckley, August Cook, H. H. Richardson, F. and C. Wutrick and M. L. Ruetenik. The outdoor celery in the gardens of H. H. Richardson and M. L. Ruetenik was exceptionally good. It had all been carefully sprayed, and there was very little indication of blight. The celery in nearly all cases was second crop, following early potatoes, peas, beans, radish, spinach, and, in one case, early cabbage. Paper was used for bleaching in nearly all cases.

In Mr. Cooke's greenhouse they were planting celery for a winter crop. It was planted about 9 or 10 inches apart, with paths at intervals. Mr. Cooke informed us that about the time this celery would be ready for market there was usually a glut of lettuce, and at that time there was a ready market for celery.

Visitors were greatly interested in the pre-cooling plant and cold storage warehouse at Mr. Ruetenik's. This is just completed and will be used especially for storing celery.

The evening session was devoted to a round table discussion on greenhouse problems and new crops suitable for forcing, led by Mr. R. L. Watts, State College, Pa. Among the crops suggested were celery, rhubarb, green onions, witloof chicory, cauliflower and lima beans. Mr. Ruetenik told of a successful crop of celery grown in his greenhouse this spring. The variety was Paris Golden, sown on January 20, pricked out when large enough 2 x 2 inches apart and set in the greenhouse beds 18 x 5 inches apart about April 15th. This crop was marketed between June 1st and 15th and realized from 65 cents to $1.25 per dozen. Mr. Ruetenik is also trying a fall crop of celery this year. Paul Work, of New York State College, led the discussion on muck land problems on Thursday morning.

The afternoon session was taken up with the reports of committees and election of officers.

Mr. D. M. Shoemaker, of the Department of Agriculture, Washington, D.C., presented a report of the Committee on Seed Inspection and Certification. He pointed out the desirability of greater uniformity of stocks of vegetable seeds. Seed potato certification and inspection is now in force in several states. It was suggested that there be two forms of certification, first as to freedom of disease and second as to purity of stock and trueness of varietal type.

The Committee on Nomenclature also gave a progress report.

It was stated that the American Seed Trade Association had appointed a committee to co-operate with the committee of the Vegetable Growers' Association, and take definite steps towards securing uniformity in the varietal names of vegetables and a decrease in the practice of sending out all sorts under new names.

The Convention closed with the annual banquet.

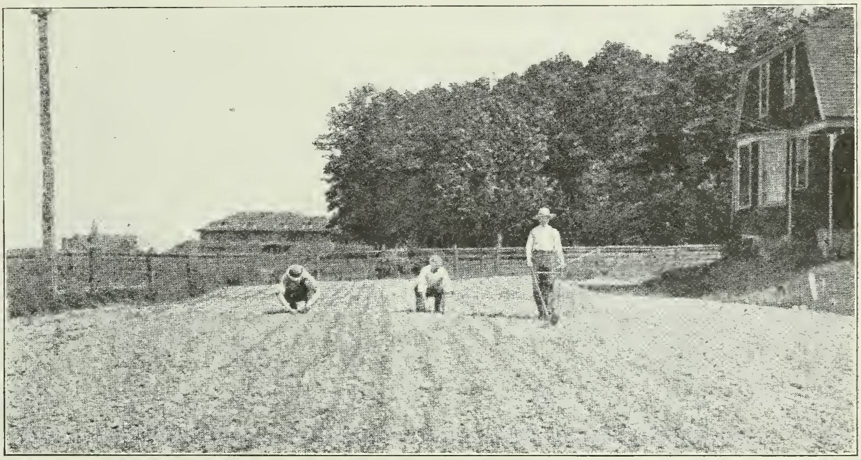
NOTES ON MUCK LAND, FOLLOWING DISCUSSION AT CLEVELAND CONVENTION OF A.V.G.A.

Muck may be defined as plant remains which have undergone more complete decomposition than in the case of peat. Muck is brown or black in color, and shows much less of the original plant structure than does peat. The plant food constituents in muck are not quickly available. Drainage, liming, applications of phosphorus and potassium compounds, and tillage, are the means employed to make muck soils productive. Van Slyke says: "A good bed of muck on a farm should be regarded as an important source of soil fertility, though largely indirect." It may be used for soil improvement, being used as an absorbent for liquid manure. But the main consideration of muck soils is in the growing of special crops such as celery and onions.

The round-table discussion was led by Paul Work, who started by giving a description of the formation of these muck lands. The prehistoric glacial action formed mounds and gulleys, which make up a "rolling" country.

In some of these hollows or "pockets" small lakes were formed, which were gradually filled in by plant growth. As these plants settled to the bottom and larger plants and trees grew upon the surface, we had, in time, a swamp formed.

Organic matter, such as leaves, branches and whole trees which settled into the swamp, underwent decay or fermentation through the action of bacteria in the absence of air. In the presence of air, this action is replaced by one which results in the complete combustion of the organic matter to carbonic acid gas.



Planting the seeds.

After years of this water-logged condition, in which organic material accumulates, we have formed large deposits of black or dark brown material known as humus or muck. It is essentially the same as the humus which we try to incorporate into any of our garden soils by the addition of barnyard manure or green crops plowed under. In a pasture more humus may be found that in a continually aerated, arable soil, more again in clays than in the lighter soils through which air easily penetrates. In other words, it is more difficult to maintain a sufficient humus supply in sand than in clay. This is for the reason that humus accumulates in the absence of air, as in water, which brings about the swamp condition. The accumulation of humus (or muck) reaches its maximum where considerable rainfall and an impermeable stratum combine to form a swamp or bog.

Under the above-mentioned conditions, calcium deposits are formed underlying the muck. This may be marl or clay. An old practice in England, in reclaiming, or bringing muck land under cultivation, was the marling process. Trenches were opened to the bed of marl or clay always found beneath the peat, and the clay thrown out and spread at the rate of 100 loads or so per acre. Where marl is less available, peat has to be brought into cultivation by draining the land with open cuts, allowing some considerable time to elapse during which the peat dries, shrinks, and consolidates, and then correcting the acidity with lime."

A characteristic of muck soils is their deficiency in soluble mineral constituents, notably salts of lime and potash. Because of the acid nature of the medium, it is also noticeable that bacteria of nitrification are absent or few in number.

Before considering the treatment of mucks, we must recognize the wide variation in their fertility. Coniferous mucks, or those formed from the growth and decay of "evergreen" trees, are brown and chippy. These are not so old as some other muck lands, or are of more recent formation in the long past. The deciduous mucks, or those formed from ash, maple, elm, etc., are older, black in color, more fertile, and come more quickly into use.

Another characteristic of the muck land is that its situation is low, usually in a sort of pocket, and therefore subject to frosts. For this reason we cannot have real early muck land.

A decided disadvantage with this type of land is that it lies level, is made up of very light material, and may be so windswept as to have the entire crop of seed blown away. As a preventative against a calamity of this kind, it is not desirable to attempt the growing of windbreaks. A movable wire and lath fence has been found very satisfactory. Another grower has found the most economical and satisfactory windbreak a fence made up of three wires stretched on posts or stakes. On these wires bags, in which the year's supply of fertilizer had been received, were cut open and fastened with ordinary clothes pins.

Drainage.—The question of drainage has to do with the moisture relation. Muck is the same as that material we call humus. It is porous, fibrous, vegetable material. Soils, on the other hand, are formed from rock. When we incorporate humus into any soil it helps to retain moisture. Humus binds together a sandy soil and makes it more retentive, while it makes a clay soil more open, due to the fact of clay being made up of very minute particles.

We find some muck soils 3 to 4 feet deep underlaid with about 10 feet of marl.

New mucks are generally hard to drain with tile; the difficulty being caused by the uneven sinking. In many cases, open ditches have first been used and sometimes are the only means of drainage. The chief objections to permanent open ditches are the inconvenience in crossing and the amount of land occupied. A calculation of the amount of land taken up with open ditches on some farms is surprising.

The tile drains have given best results when placed about 2½ feet deep. This maintains a water table close enough to the surface to allow plenty of water to rise by capillary attraction. One grower advocates the use of boards, on which to lay the tile, thus giving an easily obtained, level surface, and keeping the tile even until they have all settled. Another grower has never used boards under the tile, but has filled in the ditches gradually during the season. It requires greater care in laying tile in muck. Ditching machines have been used successfully on large areas.

Muck contains up to 4 per cent. of nitrogen, but not in an available form. For this reason it is necessary to apply fertilizers before we can hope to obtain best results. Undoubtedly muck requires a complete fertilizer and a 4.8.10 has been recommended as a good practice.

One grower prefers 2 tons wood ashes, ½ ton acid phosphate, and 150 lbs. nitrate of soda. Another grower has produced good crops with only 50 pounds nitrate of soda per acre.

Lime is of use and should be applied if the soil is acid, otherwise it may not be beneficial. In all cases bacterial action of the aerobic forms is needed. These bacteria may be introduced through the applications of barnyard manure.

Mr. Roebuck has found best results in the use of wood ashes, acidulated acid phosphate, and nitrate of soda.

Mr. Bowney, of the Western New York Farms Company, claims commercial fertilizer to be necessary, and advocates nitrate, phosphoric acid, and muriate of potash.

Coniferous mucks are less fertile, and because of the presence of resin there is less nitrogen.

Overhead irrigation is not used to any extent on muck land, but in Michigan the ditch method is used successfully.

Crops.—The crops which are favored for muck soil include onions, celery, lettuce and spinach. Cauliflower is a doubtful crop. Varieties of spinach most successfully grown are: Victoria, Viroflay and Eskimo.

Onion seed is best produced on upland rather than muck. Good potatoes are produced on some mucks in fall or spring, and the very best seed potatoes.

Muck soil has not been found satisfactory for greenhouse work; a sandy soil generally being preferred.

FERTILIZERS BEST SUITED FOR VEGETABLE CROPS IN ONTARIO.

B. Leslie Emslie, Division of Chemistry, C.E.F., Ottawa.

Market-gardening, or the Growing of Vegetables and Small Fruits, is a specialized and important branch of agriculture. It is the superlative expression of "Intensive Farming," whose successful pursuit demands intelligence, skill, business acumen, and, perhaps, above all, a knowledge of soils, manures and fertilizers, the factors which control in a very large measure the quantity and quality of the produce.

The primary object of the market gardener is to secure a maximum yield of first-quality produce from the land at his disposal, frequently a very limited area. Of equally great importance in the production of certain crops is the attainment of early maturity which permits the marketing of the crop at a time when the particular commodity is comparatively scarce and consequently commands a higher price.

"The early bird gets the first worm" is a proverb particularly appropriate in its application here.

It is not intended that this should form a treatise on vegetable and fruit-growing, but a simple and brief statement of certain important matters relating to the industry, a discussion of which may assist the market gardener in the successful and profitable pursuit of his calling.

Quality in Vegetables.—Although vegetables have a distinct food value, they do not primarily find a place in the diet of the majority by reason of their sustaining qualities. It is rather their wholesomeness and palatability and the fact that their use allows a pleasing, economic and thoroughly rational variety to the diet that a prominent place on the menu is accorded them and especially on that of the chief meal of the day. Quality ranks in importance with earliness and yield;

it is the factor that largely determines the commercial as well as the culinary value of the produce. Especially is it of importance, if the market gardener seeks to establish a reputation and a steady, profitable market for his vegetables, as is accomplished to-day by the dairyman and the poultryman for their produce.

Quality in vegetables implies succulence, crispness, good flavour, an absence of woody fibre, or stringiness, pungency and bitterness. Thus, in early beets and turnips, to be palatable, there must be no development of woody fibre: radishes must be crisp and free from pungency, lettuce must be tender with no suspicion of bitterness.

How is quality obtained apart from that inherent to and naturally governed by the variety? The answer is: By a quick and uninterrupted growth. The development of the crop must be rapid and continuous. Apparently the next question to be answered is: What are the factors, the conditions, that control this rapid growth? The factors are, briefly: Favorable climatic conditions, warmth, sunshine, rain, an agreeable, suitable soil, and an abundance, indeed an excess, of available plant food in the soil, ready at all times, when conditions of growth are favorable, to be utilized.

The recent introduction of irrigation systems enables the market gardener to partially control the moisture supply, and in greenhouse work practically all the factors are under his control.

THE SOIL.—It is unnecessary to describe the manner in which soils have been formed by the ceaseless operation of natural constructive and destructive agencies. Fertile soils are chiefly composed of varying proportions of sand, clay, limestone and humus. According to the predominating ingredient, soils are designated as sandy, clayey, limestone or muck. A loam soil is a blend of approximately equal proportions of sand and clay with an admixture of humus. A loam or sandy loam is the ideal soil for market gardening.

The soil must be well drained to permit the free circulation of air and moisture, and, at the same time, must be liberally supplied with humus to ensure the retention of sufficient moisture for plant requirements. A water-logged soil is always a cold one, and the sun's rays, instead of transmitting warmth to the soil, are utilized in evaporating the superfluous moisture.

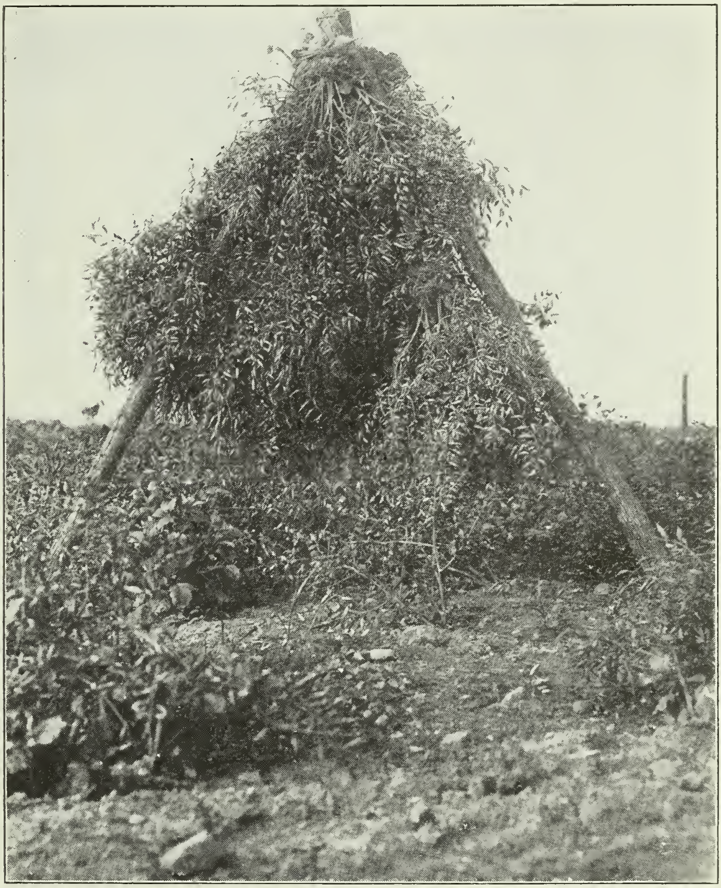
The maintenance of the humus supply in the soil is important in all branches of agriculture, but particularly so in that of market gardening. Humus not only fulfils the mechanical function of rendering soils porous and more retentive of moisture, but furnishes also the essential medium for the activities of the favorable bacteria, and represents the chief natural source of the soil's nitrogen supply.

NECESSITY FOR MANURE.—The importance of manure in market gardening can scarcely be over-estimated. Stable manure has been and probably always will be the main stand-by of the market gardener. Its chief value is not due to its fertilizing properties—and these are not inconsiderable—but rather to the fact that it supplies humus forming material, without which the soil cannot become an ideal medium for the growth of crops. Very liberal manuring is necessary in order to maintain an adequate humus supply. Cultivation, or frequent stirring of the soil, promotes the oxidation and decomposition of organic matter, and thus depletes the humus. Consequently, in market gardening, where cultivation is essentially thorough and crops frequent, the rate of humus depletion will be exceedingly rapid were insufficient means employed for its maintenance.

It is possible, of course, to apply excessive quantities of manure, which, besides being wasteful, would be inimical to crop growth, but such a possibility is remote in market garden practice, where the frequency of cropping entails a heavy draft on the available plant food.

No farm product is so variable as manure whose composition and value depend on a great many factors. Among those are the kind, age, function and food of the animal producing it, the quantity and nature of the litter employed, and, last but not least, the care taken in its storage.

The analysis of a large number of samples of mixed fresh horse and cow manure from animals well fed and sufficiently bedded with straw to hold all the liquid excreta, gives the following average figures per ton. Nitrogen 10 lbs., phosphoric acid 5 lbs., potash 10 lbs.



Method of drying radish seed on Otto Herold farm, Beamsville, Ont.

For the ordinary type of market garden soil partially rotted, "short" manure is better than fresh, "long" manure, and it should be well worked into the soil. If it is necessary to hold manure for any considerable length of time before its application to the soil, the heap should be kept compact and moist and protected from leaching rains.

The specialized nature of the market gardener's operations precludes the possibility of producing any appreciable quantity of stable manure on his own premises, and he is, therefore, dependent largely on city stables for his manure supply.

Although the production of the manure he uses is beyond his control, it is none the less necessary that the market gardener should be familiar with the factors which regulate its value.

Losses from manure occur chiefly through fermentation and leaching. If piled in a loose heap, fermentation (due to the free access of oxygen) is rapid, and serious loss of nitrogen, in the form of gases, results. Horse manure, being of looser texture and containing a larger proportion of undigested food, ferments more readily than cow manure. To reduce the danger of excessive fermentation, the manure heap ought to be kept firmly packed and reasonably moist.

Loss through leaching occurs when the manure heap is exposed to the action of heavy rains, or when the water hose is turned on it, after it has been loaded on the railway cars.

When we consider that more than one-half the nitrogen and nine-tenths, or nearly all, the potash of manure is contained in the liquid portion, the seriousness of this loss by leaching can be readily appreciated.

At the present time the potash contained in manure represents the almost exclusive source of that ingredient for the market gardener, so that careful conservation of the liquid manure is now particularly important.

THE COMPOST HEAP.—In market gardening the compost heap finds an appropriate place and provides a means of profitably utilizing large quantities of vegetable refuse, which would otherwise go to waste. If these are composted with a little manure and good loam a valuable soil dressing may thus be produced at a very small cost.

NITRIFICATION.—Incidental to the decomposition of humus in the soil is the process of nitrification, or the formation, through bacterial action, of nitrates, the form in which non-leguminous plants take up their nitrogen. In the decomposition of organic matter certain acids are formed which require the presence of lime to neutralize them and permit the bacteria to work uninterruptedly. For example, the bacteria producing lactic acid in sour milk cease their activities when .7 per cent. of the acid is present in the solution; if, however, a neutralizing base be added, the bacterial operation is resumed, and continued until the .7 per cent. of free lactic acid has again been attained.

LIMING.—It is safe to assume that the majority of market garden soils, to which heavy applications of manure have been made, will be benefited by lime in some form. Any soil which contains less than .5 per cent. of lime may be said to require liming.

The object of liming may be two-fold: first, to correct acid conditions, and second, to liberate mineral plant food, the latter object deserving special consideration at the present time.

Limestone, or carbonate of lime, also known as "mild" lime, is the chief naturally occurring lime compound, and is a suitable, safe form for general application.

When limestone is burned carbonic acid gas is driven off and lime, known as "burned," "quick" or "caustic" lime, is obtained, 100 lbs. of limestone yielding 56 lbs. of lime.

If water be added to lime, "slaked" or "hydrated" lime results.

Slaked lime, when exposed to the free action of air, gradually absorbs carbonic acid gas and thus reverts to carbonate of of lime.

Both the burned lime and slaked lime are caustic in their action and vigorously attack the soil's organic matter. For this reason caution must be observed in their employment, which should be restricted to soils very rich in humus and to heavy clays. On the latter type of soil lime acts beneficially by destroying the natural cohesiveness of the clay particles.

An initial application of limestone, to soils pronouncedly deficient in lime, might be made at the rate of four tons per acre, which amount would be equivalent, in lime content, to about three tons of slaked lime or two and a quarter tons of burned lime.

Land plaster, or gypsum, is a sulphate of lime, of which there are natural deposits in Canada. Gypsum is valueless as a soil-acid neutralizer and ought never to be applied with this object; in fact, it would rather tend to increase the acidity, as sulphuric acid, with which lime in this form is combined, is one of the strongest acids known.

Gypsum, however, when judiciously applied, at the rate of 500 to 1,000 lbs. per acre, may prove beneficial by virtue of its effect in liberating plant food.

While most of the unfavorable bacteria seem to thrive in acid soils (e.g., *Plasmodiophora brassicæ*, produce "club root" in turnips and cabbage), an exception should be noted in *Tubercini scabies,* causing potato scab, which is encouraged by an excessive alkaline condition of the soil. For this reason it is not advisable to apply lime, in any form, to land immediately before its occupation by a potato crop, the better plan being to apply it at a place in the rotation furthest removed from that crop.

GREEN MANURING.—The growing and plowing in of a cover-crop furnishes a valuable means of supplementing the manure supply where the latter is scarce, but is more adapted to "extensive" than to "intensive" agriculture, and, therefore, cannot be fully taken advantage of by the average market gardener.

Legumes, such as clover and vetches, owe their popularity as cover-crops to the peculiar faculty, common to all plants of that family, of deriving their nitrogen supply from the soil atmosphere by the aid of special bacteria which live in little nodules on their roots. Where its practice is possible, green-manuring with legumes commends itself as a means of enriching the soil in humus, as well as of supplying a large amount of valuable nitrogen, the most expensive ingredient in commercial fertilizers.

COMMERCIAL FERTILIZERS.—These should be regarded, by the market gardener especially, as supplements to rather than as substitutes for stable manure. At the same time they can probably be more profitably used in market gardening than in any other branch of agriculture, for when accompanied by thorough cultivation their use is attended by the most beneficial results.

Of the ten or twelve plant food constituents essential to plant development, but three tend to become deficient in available amount for crop requirements in the average soil. These are nitrogen, phosphoric acid and potash, and commercial fertilizers are employed with the object of supplementing the soil's available stock of these plant foods. We have noted that a ton of average, well conserved stable manure contains about 10 lbs. nitrogen, 5 lbs. phosphoric acid, and 10 lbs. of potash, so that manure may be considered a complete fertilizer. When we realize, however, that the majority of crops require at least twice as much phosphoric acid as nitrogen, it appears that manure is too highly nitrogenous to be a well-balanced fertilizer for certain crops. It is here that fertilizers find a use as balancers and in permitting a more economical use of the manure.

Numerous experiments have proved that in the production of large yields of first-rate quality the combination of a medium application of manure and suitable commercial fertilizer has produced results superior to those obtained from manure alone.

A knowledge of the functions of the three fertilizer constituents—nitrogen, phosphoric acid and potash—will guide the market gardener in the intelligent application of manures and fertilizers to hiis crops.

Nitrogen promotes the growth of stem and leaf, to which it imparts a deep green colour, and gives bulk to the crop. It is, therefore, an important constituent of a fertilizer for cabbage, lettuce, or other leafy crop where a large leaf development is desired.

Hothouse cucumbers ready for market, uniform in size.

Phosphoric acid promotes the fruitfulness and early ripening; it influences chiefly the root development in the early stages and seed or fruit formation in the later stages of growth, which explains its importance for turnips and grain, as well as for all fruit of seed-bearing plants.

Potash is essential to the formation of carbohydrates, which comprise the starches of potatoes, grains, etc., the sugars of fruits and vegetables, and the fibrous matter of plants.

Ready Mixed Fertilizers.—There are numerous brands of mixed fertilizers on the market, containing varying percentages and proportions of nitrogen, phosphoric acid and potash, and usually designated by the manufacturer as suitable for certain specified crops, but the market gardener will find the purchase of the separate fertilizer materials the more economical and convenient practice.

If asked to recommend a standard vegetable fertilizer, we should consider one containing 4 per cent. nitrogen, 8 per cent. phosphoric acid and 10 per cent. potash as approaching the average requirements; 530 lbs. nitrate of soda, 1,000 lbs. acid phosphate (containing 16 per cent. available phosphoric acid) and 400 lbs. muriate of potash would represent the equivalent of one ton of 4-8-10 goods.

Quite evidently the primary object of fertilizing ought to be the supplementing of the soil's supply of immediately available plant food, thus ensuring adequate and proper nourishment of the crop during the most critical stages of growth. It therefore follows that the choice of materials should fall on those which will most readily yield up their elements of fertility, and a judicious selection is, as a rule, possible only with the employment of the separate fertilizer materials.

In many of the ready-mixed, "complete" fertilizers the plant food ingredients are present in slow-acting forms which, although suitable, perhaps, for certain crops whose period of growth is long, are not desirable in market gardening, where it is necessary to exert, to the greatest possible extent, control over the rate and amount of plant food assimilation at different seasons. Such a control is most nearly attainable through the judicious use of quick-acting fertilizers.

Nitrogenous Fertilizers.—*Nitrate of Soda* (containing 15 to 16 per cent. of nitrogen) is the most popular and quickest acting source of nitrogen. Owing to its extreme solubility, the rapid availability of its nitrogen and to the fact that, on light soils especially, nitrogen is liable to get leached to the subsoil by heavy rains, applications of nitrate of soda should not exceed 100 lbs. per acre at one time. The best results are secured by small and frequent applications, given according to the crop's demands.

The function of nitrogen in promoting growth of the vegetative parts renders caution necessary in applying nitrogenous fertilizers to fruit or seed-producing plants, as an excess may prove detrimental by causing abnormal and protracted growth and immature or late fruiting.

Sulphate of Ammonia (containing about 20 per cent. of nitrogen) is rather slower in its action than nitrate of soda, and perhaps, more suitable for application in moister climates, provided that the soil is adequately supplied with lime which is necessary for the nitrification of its ammonia.

Dried Blood (containing 12 to 16 per cent. of nitrogen), a by-product of meat abattoirs, is a valuable organic source of nitrogen and very suitable for market gardening, but its cost often prohibits its use as a fertilizer.

Tankage of various grades, also an abattoir by-product, finds extensive employment in the preparation of ready-mixed fertilizers. There are numerous other materials, such as wool and hair waste, hoof and horn meal, whose nitrogen is so slowly available that they cannot be considered worthy of a place in market garden practice.

Phosphatic Fertilizers.—Bones represent the oldest phosphatic fertilizer and are still employed in various forms. Of these *Steamed Bone Flour* is one of the most valuable, its fineness rendering it more easily decomposed than ordinary ground bone. Being an organic substance, bones are attacked by soil bacteria and ultimately most of their phosphoric acid becomes available, but the process is slow.

Dissolved Bones (containing 13 to 17 per cent. of available phosphoric acid) result from the treatment of animal bones with sulphuric acid to render part of their phosphoric acid soluble in water, and, therefore, more readily available to plants.

Sir John Bennet Lawes, founder of the world-famous experiment station, at Rothamsted, England, commenced in the year 1834 to conduct experiments with bones as a fertilizer, and found that by treating with sulphuric acid the phosphoric acid of the bone was rendered more available to plants. Later on, the discovery of the mineral phosphates furnished him with a new material which, treated in the same way, produced similar results.

Superphosphate or Acid Phosphate (usually sold in two grades, containing 14 and 16 per cent. available phosphoric acid respectively) is the most popular and quickest acting of the phosphatic fertilizers. It is produced from the treatment of raw phosphate rock with strong sulphuric acid. Phosphate rock is a phosphate of lime, and the action of the sulphuric acid results in the replacement of part of the lime by water, creating a water-soluble phosphate. All the phosphoric acid is not present in this form, however; part is in the form of di-calcic phosphate which, although not soluble in water, is soluble in dilute acids, such as are present in the soil, and, therefore available to plants. Another small proportion of phosphoric acid in Acid Phosphate is insoluble and practically valueless. The term "available" in its application to the phosphoric acid of fertilizers denotes that which is soluble in the chemist's citric acid test and includes the water-soluble, as well as the citric-acid soluble.

Basic Slag (containing about 12 per cent. available phosphoric acid) is a by-product in the manufacture of steel and is placed on the market in the form of a fine powder, 80 to 90 per cent. of which should be sufficiently fine to pass through a sieve having 10,000 meshes per square inch. None of the phosphoric acid in Basic Slag is water-soluble, and it is, therefore, slower in its effects than Acid Phosphate, but is often preferred on account of its basic nature for soils which are deficient in lime. Some brands of Basic Slag contain the equivalent of 40 per cent. carbonate of lime. In the preparation of Acid Phosphate sulphuric acid combines with lime to form sulphate of lime, or gypsum, whose characteristics we have already noted, so that acid phosphate contains a fairly large proportion of gypsum.

POTASSIC FERTILIZERS.—Previous to the war, the principal sources of potash were muriate of potash and sulphate of potash (each containing about 50 per cent. of potash), obtained from Germany. Now they are practically unprocurable, or only at such prices as preclude their use in agriculture. Consequently we have to turn our attention to substitutes, but the list of these is small and their supply limited.

Wood Ashes, once so plentifully produced in Canada, are one of the best, if not the very best potash fertilizers. They contain their potash in the form of a carbonate, the most favorable form for the nutrition of crops; they also contain about 2 per cent. phosphoric acid and 20 to 30 per cent. carbonate of lime. Their potash content varies, in good, unbleached ashes, from 4 to 6½ per cent.

Seaweed represents another source of potash, but is at present available only to those located on the seaboards.

Owing to the scarcity of potassic fertilizers, it would, therefore, seem that resource must be had to other means of overcoming the deficiency of potash in the soil. No other plant food can entirely replace potash in its functions, but it has been noted that where a marked deficiency of potash occurs plants will assimilate abnormal quantities of soda. Nitrate of soda then would appear to present a partial solution of the problem, although its favorable action in this direction would be probably more particularly due to its appreciable effect in liberating soil potash.

The use of lime, or lime compounds, as potash liberators has already been referred to. Another substance, sulphate of soda, has been suggested as a means to the same end, but, as this salt is the predominating one in the unproductive "alkali" lands, we should hesitate to recommend its extensive use.

After all, the market gardener is probably less affected by the potash shortage than are his brother agriculturists, for experiments have shown that where large, or even medium applications of good manure are made, the addition of further potash, as a fertilizer, is frequently unnecessary.

Attempts are sometimes made to prescribe fertilizer mixtures for certain crops, but, owing to the widely varying conditions of soil, climate, etc., and to different methods of treatment, these cannot have a very wide application. Within certain limits, of course, we may be able to predict results from the use of special fertilizers on crops whose peculiar appetites are known, e.g., the passionate fondness of the cabbage for nitrogen, of turnips for phosphoric acid, and of potatoes for potash.

It remains for the market gardener to discover by experiment on his own soil its more exact fertilizer requirements.

In market gardening, however, there is not the same necessity for close figuring as there is in general farming with its wider areas and less valuable crops, so that he will do well to err on the side of excess rather than on that of frugality in the feeding of his plants, bearing in mind that any surplus of phosphoric acid and potash over immediate requirements will be retained in the soil for future crops.

J. J. DAVIS: In my experience with fertilizers (and I have used them a good many years and to good advantage) I have found that potash is the one thing that I can dispense with more than either nitrogen or phosphoric acid on my land which I have cultivated for a period of at least twenty years, and I am buying more fertilizers to-day than I ever did. I find that the chief thing I need is nitrogen. I use phosphoric acid, and previous to the war I used potash, too, but I never saw any conspicuous results from the use of potash.

B. L. EMSLIE: What is the nature of your soil?

J. J. DAVIS: It is ordinary gravelly or sandy loam. There are lots of such soils in the country—rather porous land with pretty good heart in it, but too open bottom and it needs lots of feeding. It has been my experience that less of potash and more of nitrogen is what my land needs.

J. W. RUSH: I dare say nitrogen applies very well to leaf plants, but how does it work out with other crops, such as potatoes, tomatoes, etc.?

J. J. DAVIS: I find it works out pretty well. I have grown wonderfully fine crops of tomatoes, in fact, it has been one of my principal crops indoors and out of doors. I make a good proportion of my money on tomatoes—the nitrogen gets them along early. Of course, a person can go too much in that direction, because I believe a person could put on enough nitrate of soda so that his tomato plants would run wild, but I find, after the tomato plant once begins to set fruit, it is best to give it lots of nitrogen, and the fruit that is forming will keep the plant from running wild, and the nitrogen will protect all the fruit that it will set.

THOS. DELWORTH: Have you made any experiments with phosphoric acid?

J. J. DAVIS: Not separately; what I have principally used the last few years is a grade of six ammonia, thirteen phosphoric acid. Before the war started I used muriate of potash and used it rather liberally, but since the war started I have managed very well without it.

John Brown: This year I did a little work in the tomato line, trying out both nitrogen and potash. When we came to picking the tomatoes about the 20th of July, I found that we could pick ten baskets more to the 100 plants on the potash-fed plants than on the others.

B. L. Emslie: Regarding Mr. Davis' remark: of course 4-8-10 is a fertilizer pretty high in nitrogen, and the proportion of phosphoric acid is almost always higher, but I quite agree with him that results can be obtained under certain soil conditions with nitrogen alone. There is not the same necessity for buying potash, and it has been the experience of countries in Europe, that they have got good results by using large applications of good manure without potash, but where manure is of poor quality, the potash proved necessary.

The question was asked, what quantity of lime should be applied to ground where clover is grown or on a loam soil. Unless it is pretty rich in humus—and I imagine in this case where clover is grown that it would be rich in humus—an initial application might be used of two tons per acre, that is equal to nearly four tons of limestone in lime content. It aids decomposition of organic matter. Two tons as an initial application of burned lime—brick lime—would be suitable for soil rich in humus, or on heavy clay as I mentioned before.

Market gardening.

J. J. Davis: What form do you consider is the best form in which to apply lime?

Thos. Delworth: As a general rule, I consider as carbonate of lime: but perhaps at the present time while potash is scarce, on my heavy clay soil or other soil that may not be so heavy but contains a large quantity of organic matter, I would be inclined to apply the lime in the form of burned lime, but only in such a case, because its action in developing plant food is more rapid than in the form of the carbonate of lime.

John Brown: What would you call excessive manure?

B. L. EMSLIE: It would depend on the crop—take, for instance, cabbage, it is hardly possible to apply too much manure for it.

F. G. H. PATTISON: The French gardeners, who have, perhaps, with the exception of the Japanese effected the most extraordinary results in gardening, use from 500 to 1,000 tons to the acre of manure. I know very well about the French gardens, as I made a special study of that.

A DELEGATE: How is a man to know if his soil needs lime manure?

B. L. EMSLIE: The best way or the quickest way to find out if soil requires lime is to test it with blue litmus paper. You take a sample of soil and add a little water to it, put it in some vessel and put the litmus paper in, and after about fifteen minutes, if the blue paper turns red, you may assume that the soil is acid and requires lime, and of course, to some extent, the rate at which this effect is noticeable, would indicate the degree of acidity. But that is the simple way to find out.

A DELEGATE: One of our fertilizer companies has been charging $9 per ton for carbonate of lime. Another firm in Toronto are putting it up, if I remember correctly, in carload lots, in sacks, f.o.b. Toronto, at somewhere about $4 or $4.50 per ton. Now in a great many parts of the Province we have deposits of marl, and near my own place I found a deposit of this material. I sent it to Guelph, and I find it contains 90 per cent. pure carbonate of lime. In this case, of course, the demand was not enough to make it a commercial proposition, but where there are deposits of marl in any of your parts of the country it would be a very good idea to send a sample of it either to Professor Emslie or to Guelph, and it will prove a much cheaper source.

F. G. H. PATTISON: In connection with the carbonate of lime, in the Niagara Peninsula they were selling in carload lots, crushed at 80 cents a ton, delivered in the fruit district. I should think you could get that at any time.

A DELEGATE: Would that be the Queenston Quarries?

F. G. H. PATTISON: There are the Canadian Quarries, Limited, Vinemount, or the Canadian Quarries at Dundas. There are two or three large concerns. As a matter of fact, the fruit growers can get it and can hold it themselves over the winter. It is crushed very fine, so as to be available.

PROF. CROW: In regard to Mr. Pattison's statement as to the use of manure by French gardeners--the 500 or 1,000 tons which he speaks of as being used are not used in the nature of a fertilizer, as I understand it, but to make practically a hot bed of the entire ground. I understand the ground is practically solid manure, and they grow their vegetables in that way.

As to how humus can best be obtained, I notice in the *Market Gardeners' Journal* that some growers on high priced land near cities and under irrigation as well are putting down a portion of the lands, dividing their land, so as to make it a rotation—probably every six or seven years—in clover for an entire season in order to plow down for humus. Now would our market gardeners feel that it would pay them to devote even a small part of their garden to late clover for an entire season to plow down?

A DELEGATE: I think that depends on what stable manure costs to lay down in his place.

JOHN BROWN: I tried a little of that experience. I put in seventy-five tons of store manure from Toronto; the next season I could not get anything out of it, as I could not get my humus back. I put a strawberry bed in. This year, however, it was not in any part of the product except the strawberry bed.

J. J. Davis: In regard to what Prof. Crow said, the trouble is in plowing clover down, that he would need to give it a whole season, and we are generally limited as to area. Most of the gardeners of to-day don't like to lose a piece of ground a whole season for that purpose. I have taken off one crop, say beets or something like that, a crop that I could get off early, and then sowed the ground with Hairy Vetch. I had some time in plowing it down. It took three of us to get it under. Of course that was the first time I had tried it, and it took three of us a day and a half to plow about one and a quarter acres. The result was that the next year there was a crop and you could see that it did the ground good. After that I never let it get so tangled before plowing it under. This time it was getting to seed and you simply could not do anything. In some places the coulter would not go through. I put a man at it and I went to market, and when I got home they had given it up for a bad job. Then I got a rolling coulter and set them at it again, and it was not much better, so I went at it myself, and I did it, but I think it is a great thing for supplying the land with humus. It is about as good a thing as a man can do.

Howard W. Selby: Our ground near Philadelphia is valued at from $800 to $1,000 an acre, and as a brother at the end of the table said, we do not like losing any part of that ground for a season, but we have planted this Hairy Vetch for several years now, after we had taken in the beets and while the tomato plants are still in the ground, and it grows continuously all winter, and about March or the first of April, we plow it down. The way we made the discovery whether ground needed lime was to make a test with the vetch. It grew rather straggly in the ground which was left without lime and where we put the lime on, the vetch grew waist high. I drew some of the roots out of the ground, and I got parts of them which were from two to three feet in length. Now they were heavy with nitrogen-gathering bacteria, and the benefits which the ground got were certainly very great. The best celery we got was grown there, and we found that one of the best things for producing crops from your soil.

J. W. Rush: We use a double cut-away harrow, and we go over everything that is six feet high. It cuts it all to pieces, and any ordinary plow boy can operate it.

H. W. Selby: That is what we use in cutting our vetch.

ADDRESS BY FRATERNAL DELEGATES FROM ONTARIO HORTICULTURAL AND AMERICAN VEGETABLE GROWERS' ASSOCIATIONS.

Rev. A. H. Scott, Perth.

It was my privilege and pleasure, two or three years ago when President of the Ontario Horticultural Association, to come to your meeting and address you on behalf of our Association. It is to me an equal privilege and pleasure to meet you again this morning.

There are two points of contact that you will allow me to note, that make your interests and ours one. One of these points of contact you have noted feelingly and to me most sympathetically this morning, when you referred to Canadian interests and that means our personal interests, in the ghastly business that is being conducted across the sea. You spoke of your son; I have five sons. The most heroic of my five boys was the one whom we laid in his last resting place in a Glengarry cemetery a week ago last Friday—my eldest boy who fought tuberculosis for six long years and who succumbed to it just the other day. We talk about the heroes of the battlefield, and we speak of them feelingly and grandly, but we are a little inclined to overlook the heroism that is manifested often within four walls by our sick, brave and exemplary young men. I have another son who is at the head of a business department in one of the large enterprises of Canada. I have another who is a prisoner of war to-day in a hospital in Germany. Like others, he was wounded and he fell at Langemarck, left for dead by his own officers, he was afterwards picked up by the Germans and taken off to a hospital, where he has been treated since that time, and although he says he has five beauty spots in his side and a fractured hip and other parts of the body severely wounded, and is the most severely wounded soldier from the British expeditionary forces that has come to that part of Prussia, he pronounces himself lucky. I have another son who is at the head of one of the divisions of British Army Medical Corps. If he is permitted to come out as he has been permitted to do in the past, he will perhaps be able to tell us the story. My other boy is likely to go to the battlefield, and if these boys' father were younger than he is to-day, he, like they, would join the forces.

Growing carrot, beet and onion seed, Vineland Experiment Station.

It is your privilege and mine to say these things in public utterance, and I suppose there are gentlemen around these tables to-day who could tell tales which would perhaps equal or possibly excel these.

The other point of contact that brings us close together to-day, is our common interests in the soil. For in the Province of Ontario we are particularly favored by a kind Providence in bearing testimony to the world at large and in seeking to do honor to our own selves, in being privileged to cultivate the acres in this Province of Ontario, for I have somewhat of an intimate knowledge of the conditions in European countries and in other parts of North America, and I have for a long time been under the spirit of a conviction that the sun shines more beautifully on no part of God's earth than upon our own Province of Ontario, and that, if we play our parts as we should play them, there is no part of this Continent that is better privileged to tell to the world at large what can be done upon the soil than here in the place of which this City of Toronto is the centre. And in order that we may do that, we should take particular notice of the three kinds of soil cultivation. There is that kind of cultivation that is called "Extensive Cultivation," the extensive meaning the taking hold, if we are farmers, of 600 acres or twice that number and spreading ourselves over that as water is spread over a very large area, and we don't do our work well if we do it too extensively.

Then there is what is called "Pretensive Cultivation," the kind of cultivation that lifts itself in a sort of pride and says, "A million of dollars expended upon a certain place for machinery and other things in keeping," and conducting their work on that basis, leaving the impression that the ordinary man with five acres or 100 acres is not doing anything, and if we cannot do our work as the millionaire does it, we cannot get the results. That is the "pretensive way." Some people say we are failures if we do not do things that way and we should not be carrying on business, but we should not be carried away by that sort of thing.

Then there is the last and the best kind of cultivation—"Intensive Cultivation." Let us do that and do it well, and we will be pre-eminently successful, and we will be setting an example to other people.

Before I sit down, in order that I may be as practical as possible, will you allow me to give you and the gentlemen around these boards a formula that I got long ago some place and I put it down in my book, and I have it in my head and I want to keep it, and if you have not got it I want you to have it to-day. It is:

Q plus Q plus M=S.

"Q," let us call it Quality—plus
"Q," let us call it Quantity—plus
"M," let us call it Method—and it gives you
Service.

And when in our various departments we seek to be servants, doing efficient and honorable service, we are doing a noble work, and I think this formula will be of value to you.

C. W. Waid, Lansing, Mich.: It was my pleasure a few years ago to be present at your convention, and I have always had a very pleasant memory of that occasion, and I am very pleased to be with you again to-day. At that time I was engaged in market garden work, especially greenhouse work, but at this time I am connected with the State Institution—the Michigan Agricultural College—and am thrown in contact with the gardeners of that State and frequently of other states, so that while I am not actively in the work at the present time, my sympathy is with them at all times.

I realize this year has been one which has tried many of the gardeners. I might speak at some length on that one thought, but it is not necessary for us to bring up our troubles, unless by so doing we can eliminate them and improve our conditions.

I am sure that if it was possible for some of the other gardeners of the States with myself to visit you, they would realize, as I do, that your work here is very successful so far as the organization feature of it is concerned, and, of course, that means the individual as well. I was very favorably impressed in meeting with you before, with the thoroughness with which your organization work is carried on. I realized at that time that we have few, if any, organizations in the States that are accomplishing the work that this little body has been able to accomplish, and I might add that at the time of my visit there were horticultural and pomological conventions, and I saw that the work was going on well in all these associations.

Howard W. Selby, Philadelphia: I suppose an introduction of greetings from the City of Brotherly Love, sounds good to you, particularly in a time like this, but I have been very much impressed on this trip from the time I crossed the Suspension Bridge, to witness the great spirit which is being manifested throughout your Dominion. The soldiers were boarding the trains all the way from Niagara Falls, Ont., at every station right into Toronto, and they certainly showed a wonderful spirit; it made one feel that they were out for business.

To speak on behalf of the Vegetable Growers' Association of America is a thing which I am always delighted to do. Your President brought into his report on the Cleveland Convention the fact that I gave the slogan to our National Association at Cleveland that "Co-Operation must be put into Operation." It seems that we have been talking along that line a great length of time, but what we have accomplished to this time seems to be very little. But what I notice amongst the members of the Association is that they are getting down to the hard tacks of business, and while they are appreciating the importance of the production element, they are also giving a great deal of consideration to the problem of marketing. And I could never say anything along the line of vegetable gardening without talking about the ultimate and marketing problem, the end of it which brings the dollars and cents out of it, because that to me is the most serious end of our work. Low prices are bringing us to the place where we must seriously work on that phase of our business.

I would extend to you the greetings of our National Association, and I do sincerely hope that a large number of you will attend our next convention. We have enjoyed meeting the men whom you have sent as delegates, and I believe they have brought back some pointers which they appreciated and put into practice. I hope more of you will find your way to our convention next year—the place has not been decided upon yet, but it is always in a centre where there are a live lot of market gardeners, and there are points brought up for discussion which are beneficial to all present.

VEGETABLE WORK AT THE ONTARIO AGRICULTURAL COLLEGE.

J. E. Britton, O.A.C., Guelph.

At the Annual Convention of the American Vegetable Growers' Association arrangements were made for all experimental station men and all college men attending the convention to meet at supper, for the purpose of becoming acquainted and to get together for a real round-the-table talk on questions common to all. About twenty gathered, representing different parts of the country, from Virginia to Michigan and from Louisiana to Canada. When the talk began, it took the form of a discussion led by T. C. Johnson of Virginia. Now the subject of this discussion was not college problems or experimental station problems, but by consensus of all present it was: "What are the Problems of the Vegetable Grower, and how can the Experimental Station and Agricultural College serve him?"

We all meet with problems and difficulties in our work, and we are often apt to consider our troubles of a nature affecting only ourselves, and for that reason try to solve the questions alone. But in council there is wisdom, and one thing I learned from this discussion: that from every part of the country, the college and experimental station men in vegetable work are meeting similar difficulties.

Vegetable gardening is recognized as that branch of agriculture which has received the least amount of scientific attention, and yet the practical vegetable grower is more expert in his work than any other farmer. The very nature of his work demands this. He carries on the most intensive form of agriculture and practices the most economical methods. Already, in so short a time, the question of production has been passed by, and the big questions discussed at our conventions to-day are markets and marketing, co-operation, etc. These are the questions confronting the fruit growers also. But there has been, and always will be, experimental work to be done which relates to the production of vegetable crops, such as fertilizers, plant breeding and seed production, variety tests, soil treatment, insect pests, fungus diseases, etc.

In the past, fruit growers have demanded much of the colleges of agriculture, while the florists and vegetable growers have not made such demands. The responsibility for work done in the several lines of horticulture does not rest alone with the members of the Department of Horticulture or with the Institution. What the vegetable growers want they, probably, will secure. And so it is largely up to the vegetable growers to help answer that question which comes from many quarters, "What are the Problems of the Vegetable Growers, and how can the Experimental Station and Agricultural College serve their Interests?"

Referring again to the Cleveland Convention, Mr. C. E. Myers, of State College, Pa., reported for the committee on Agricultural Colleges and Experimental Stations. His report represented the results obtained from a question which was sent out to various agricultural colleges and experimental stations in order to obtain the status of vegetable gardening in those institutions. In conclusion, he said that it is quite evident that the vegetable growing interests of the country are not being entirely disregarded by the educational agencies, while in some instances they are a prominent part of the work. In most instances, however, the work is not receiving attention equal to its importance, but this is due to no fault of authorities in control of the various institutions, but rather to the fact that there has been comparatively little request by vegetable growers for the work. When a persistent demand, backed by the organized growers of the state, is made, that demand is usually supplied and vegetable gardening takes an equal rank with other phases of horticulture.

The vegetable work is comparatively new, and not as yet properly organized, but if the growers are interested, as we think they are, we may expect more rapid advancement in vegetable work, so that it will soon occupy a more prominent place.

In reporting on the vegetable work at the Ontario Agricultural College, it should not be necessary for me to mention the conditions under which we attempt to carry on experimental work or the fact that the major part of our time is devoted to lectures.

These conditions have been stated on previous occasions, and are set forth in the reports of this Association for 1911 and 1914.

In addition to growing a supply of vegetables for the institution, we have tested a few varieties and continued the plant-breeding work and seed selection.

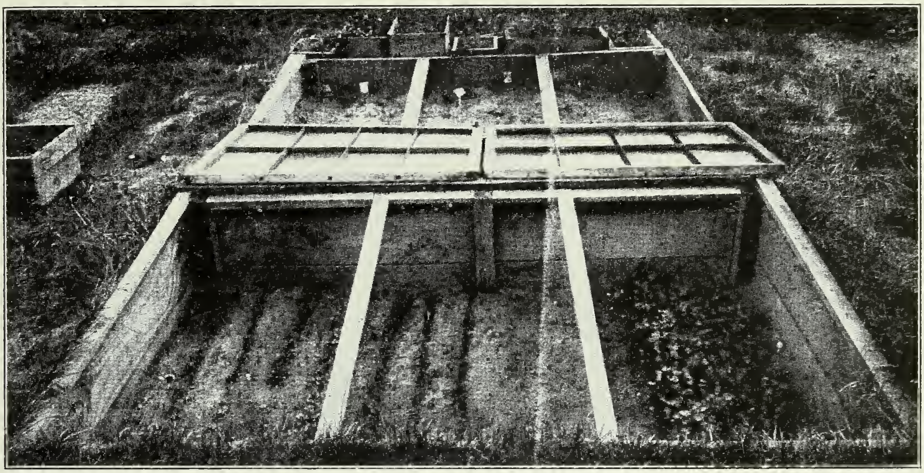
The possibilities for vegetable seed production in Ontario have received a good deal of attention within the last few years and more particularly so since the

European war has affected the source of our supply. In a small way we have been producing and testing out seeds of the following crops: celery, lettuce, beets, carrots, cabbage, onions and asparagus.

I will give an account of our work with these crops for seed and any other notes which relate to the various crops mentioned.

ONIONS.

The past season has been particularly suitable for the development of fungus diseases. In some of the onion-growing districts, the Onion Mildew (*Peronospora schleideniana*) has caused considerable loss. In one instance alone, the grower intended to plow under the entire crop of five acres. At the College the onions were almost entirely free from this disease. No preventive methods were employed other than a rotation of crops, or growing the onions on land which had not produced onions within four years. This practice helps to protect many of our crops from disease, because the spores of the fungus causing the disease often winter over in the soil or on refuse from a diseased crop and are present ready to attack a second crop of the same nature.



Cold frames.

Generally speaking, the disease attacking one particular crop will not attack another crop unless it is closely related, such as, for instance, cabbage and cauliflower, or plants belonging to the same botanical family. This is also true to some extent with insects.

The varieties of onions grown were Yellow Globe Danvers, Southport Yellow Globe, Red Wethersfield. The seed was sown April 21st. About the same time the transplanted onions were set out. Of these we grew the following varieties: Denia, Sutton's White Leviathan, and Ailsa Craig. The Denia onion has been grown at the College four seasons with considerable satisfaction. This year one-fifth of an acre was planted to Denia. The seed of this variety was sown in flats on January 20th, and kept in the lettuce house. As the plants grew over 3½ inches they were clipped back. On April 13th they were placed in cold frames. On April 28th they were set out in cold frames. On April 28th they were set out in garden in rows 20 inches apart, and 3 inches apart in the row. On September

14th the crop was harvested and weighed. The yield per acre was 787½ bushels. The onions were of good quality, but will not keep so well as in former years, probably due to excessive moisture.

Last fall, bulbs, which were true to type, of Denia and Yellow Globe Danvers, were selected for seed growing. In the spring further selection was made to obtain those which showed best keeping qualities: The texture of the flesh as well as the thickness of the shuck is important. These were set out in well-prepared soil about April 20th, and although the season has not been favorable for seed production, a very fair sample of seed was harvested, which will be tested another year.

In the field, each parent plant is given a number, and the seed from each is tested out separately.

In onion seed production, high, well-drained land will give best results.

CELERY.

Considerable work has been done during the past two seasons in connection with the control of celery blight (*Septoria petroselini*). During the past season the celery at the College was sprayed with bordeaux every ten days from the time the plants were transplanted into flats. The spraying was continued until September 20th. At this date the disease was confined to the check rows, which had not been sprayed. Since then the blight spread more or less over the entire patch. Varieties grown were Paris Golden, Winter Queen, Winter King, Boston Market, Solid Violet and Giant Goldenheart. The Paris Golden seemed most susceptible to the disease. On ground where a blighted crop has been produced. celery should not be grown for several years.

Whether spores of the blight are on the seed or not has been ascertained by Dr. Stone of the Botanical Department. Celery seed of different varieties was obtained from different sources and examined for spores. Sufficient examples are given here to show results.

Variety.	Number of seed carrying spores in one ounce.
Golden Self Blanching (Foreign seed)	3,000 to 5,790
" " (Domestic seed)	1,050 to 1,950
" " (O. A. C. seed)	690
" " (Other sources)	4,950 to 12,120
Golden Heart	150
White Plume (3 sources)	0
Giant Pascal	6,780
Winter Queen (several sources)	90 to 540
Boston Market	720
Winter King	870

(It is estimated that one ounce of celery seed will contain 70,835 seeds).

Tests were made to ascertain whether the spores would produce the disease. but results were negative. Further tests will be made before a definite report on this point can be given. S. S. Rogers, in California Bulletin 208, states that the disease is carried over on the seed.

Two years ago we selected a few celery plants from the garden in October and planted them in the greenhouse, in order to see if we could produce seed. The result was successful. The following year we planted six selected heads of Golden-Self-Bleaching to grow on in the greenhouse. These were placed 24 inches apart, and by summer had produced large spreading tops loaded with seed. The blight spread rapidly on these plants so that it was necessary to spray them with Bordeaux several times, but with a little care a good crop of clean seed was obtained. These plants yielded an average of one-quarter pound of seed per plant. This seed has been tested in the early and late crop and gave excellent results.

BEET SEED.

The selected roots of Detroit Dark Red wintered over in excellent condition, packed in barrels in the vegetable cellar and covered with sand. The roots were planted on April 22nd, placing them deep enough to allow the necks to just protrude above the level of the ground. The seed was harvested September 24th, showing a good sample. The important points to be observed are, well-grown roots, not over-mature, perfect in type and color, and careful storage.

CARROT SEED.

Some fully grown Chantenay carrots were selected, also some small roots from seed sown in August and wintered over in the same manner as the beets.

There was no difference in the keeping qualities of these roots, but the fully-developed carrots allowed for selection in type and smoothness. The carrots were planted out April 22nd, and yielded a fair crop of seed, which was harvested about September 24th.

CABBAGE SEED.

It is probably more difficult for the grower to secure cabbage for seed than most other crops. The necessity for careful selection with cabbage has been brought to our notice when we find such a variation in type with Copenhagen Market, and such a variation in earliness with Early Jersey Wakefield. It is easier to winter over a fully-developed head than one which is not solid. A practice has been to winter over half-grown plants, which go to seed when set out, but under this method no selection can be practised. We have wintered selected solid heads in trenches, and by planting out in spring obtained a fair sample of seed. The difficult part is to store the cabbages so that they will keep in satisfactory condition. They are liable to rot badly if wet or unventilated. The variety we have grown seed from is Glory of Enhuizen.

LETTUCE.

We have had much better results from seed of Grand Rapids grown in the garden. Selected plants were marked and left to go to seed, the seed from each plant being kept separate. From this seed our greenhouse crop was wonderfully uniform in type and vigor.

ASPARAGUS.

In selecting seed of asparagus the best roots at cutting time were marked and these alone allowed to bear seed, so that cross-pollination could not take place from inferior plants. Again in this case the seed from each plant was kept separate and planted under a number. Although the plants are still in the seed row, there is a marked and noticeable difference in the lots of plants from different parents. The most desirable plants have produced a heavy root system and a number of strong stalks which do not branch until six or more inches above the ground.

The vegetable growing work at the Agricultural College is carried on largely on our own initiative, rather than following any request from vegetable growers. If there is any question regarding the report that I have covered I would like to answer it if possible. I have with me samples of the seed which we produced during the past season at the College—beets, carrots, celery and onions.

Mr. Britton showed to the members assembled an onion which he claimed was an average one, and from which they had harvested 785 bushels to the acre.

Prof. Macoun, Ottawa: Did you say that the seed was sown about the end of January?

J. E. Britton: Yes; I believe we could have obtained just as good results by sowing it about the middle of February.

Prof. Macoun: You were not looking for specially large plants then?

J. E. Britton: No.

Prof. Macoun: I would like to ask some of the vegetable growers, whether onion settings could be obtained reasonably if they were sowed at that date. The city vegetable growers found that onions grown from onion sets give much better results than from either seed or transplanted onions.

F. F. Reeves: I prefer the seed; you will not find in this locality fifty bushels of onions grown from onion sets.

REPORT ON EXPERIMENTAL WORK CONDUCTED AT CENTRAL EXPERIMENTAL FARM, OTTAWA.

A. J. Logsdail, Ottawa.

I have not handled this work myself and my own interests are chiefly in the improving and selecting of certain varieties of crops. Our experimental work is in the hands of Mr. Grier who is now in France, and the results of his work during the past summer have not been completed, but I have secured from him some of the chief points of our work for a number of years past.

For a number of seasons past a considerable quantity of home-grown seed has been distributed throughout the Dominion from the Horticultural Division, Central Experimental Farm. This seed has been selected from crops that have been under careful supervision and has been sent to private experimenters who have willingly co-operated with us in the testing of this seed.

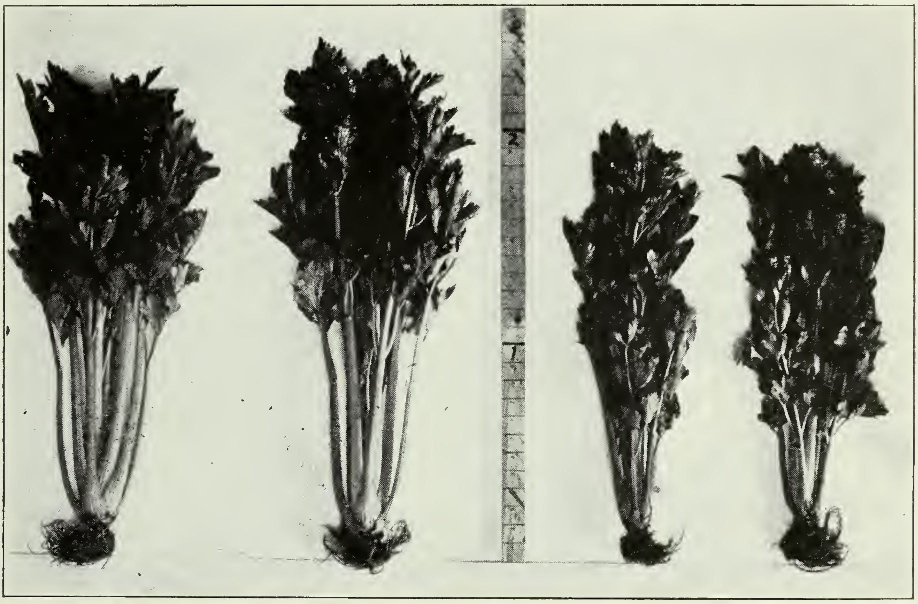
Last year we distributed over ten pounds of home-grown tomato seed at the rate of one-fifth of an ounce to each experimenter. This year we will have about twenty-five pounds of seed for distribution purposes. Sweet corn is another crop of which we have been sending out seeds. Last season we distributed one-quarter of a pound of this seed to twelve hundred experimenters, and we hope, during the coming spring, to more than double this number and somewhat increase the quantity of grain sent to each. We are doing this on the basis of the very high percentage of good reports received from season to season.

Other crops of which seed has been distributed to an extent are peas and dwarf beans. Small quantities of other vegetables have been sent at special request.

Several new varieties of sweet corn and tomatoes have been produced and are now being selected and fixed. Some of these new types are very promising and during the coming spring it is our intention to send out for experimental trial some of this new seed.

Hints in Seed Selection.

Owing to the unsettled condition of our seed markets and seed sources an earnest campaign has been carried on throughout the Dominion of Canada during the past twelve or eighteen months to try to encourage people to produce at home much of the seed that was formerly being produced abroad and paid for by Canadian agriculturists at a handsome profit to the producers.



Irrigated and non-irrigated celery, Vineland Experiment Station.

By saving seed at home one is able to secure it from the best plants of one's own crop, plants in fact that have succeeded best under one's home conditions.

The chief objects to be aimed at in seed production are three in number, namely pure seed, seed of good germination and seed from selected stock.

With regard to the matter of pure seed, one can roughly place all plants in two great classes, annual and perennial. Both of these classes can be again divided into two major sections, namely those that produce self-fertile seed and those that produce inter self-fertile seed.

With regard to the perennial types, except biennial, we have nothing to say in this brief survey of the work.

By the terms "self-fertile" and "inter self-fertile" are meant plants that are able to produce seed by the fertilization of pollen produced from the same flower as in their receptive pistil. Inter self-fertile plants are those that require the pollen from other individuals similar to themselves, but are partially at least self-sterile if pollenated with their own pollen.

Only crops which are strictly self-fertile can be grown where soil or other conditions are most suitable, without regard to the possibility of contamination of seed. As examples of such crops, may be mentioned garden peas, dwarf beans, broad beans, scarlet runners, etc., all of the leguminous types.

Crops that are not strictly self-fertile are very liable to produce mixed seed if not controlled. It would be preferable to grow a single variety of such crops, but if it is desirable to grow two varieties, the varieties should be grown at least quarter of a mile apart and with some crops quarter of a mile is too close to insure a pure seed harvest. Again it must be remembered that there is no danger of crossing between crops that are totally different, such as onion and carrot or carrot and cabbage, but crops of a similar botanical nature are very liable to cross; for example, sugar beets, mangels, garden beets may become hopelessly mixed if grown near each other. Cabbage is liable to be fertilized by several cruciferæ, some of which are dangerous weeds. In growing, therefore, a number of crops for seed the following points must be remembered:

(1) Close self-fertilized seed crops can be grown in close proximity.

(2) Inter self-fertilized seed crops must be grown in isolation, but can be grown beside other inter self-fertilized seed crops of totally different botanical origin (namely one variety of onions can be grown beside one variety of garden beets, of celery, of carrots and sweet corn), but it must be borne in mind that if it is desired to grow two varieties of any particular crop, the second variety of such crop must be grown at least four hundred yards distant from its relation.

During the past season several experiments were tried at the Central Experimental Farm in Ottawa, in the matter of growing seed to ascertain the probable quantity of seed that might be secured from small plots. Celery that had been stored in a pit during the winter was lifted in a poor condition: almost all the leaves had become decayed and the only sound portion remaining was the heart. These plants were cleaned and planted in the open and have, during the past season produced an ample supply of first-class seed.

With regard to the picking of celery seed, it was found that excellent results were obtained if the heads of seeds were picked in a green condition just prior to ripening and the heads were then allowed to dry out in a seed room. In this manner all the seed was saved and it proved to be of first-class quality. Similarly with carrots and cabbage, though with cabbage and carrots the crop requires several pickings as the heads approach maturity.

The crops that were tried during the past season in these seed experiment plots were beets, cabbage, carrots, cauliflower, celery, leeks, onion. Of these it may be said that the only real failure to produce seed was in the case of the cauliflower, this crop requiring a much longer season of growth than is possible with us at Ottawa.

As several varieties were being grown side by side an endeavor was made to keep the seed pure by covering the plants with a light grade of factory cotton stretched over a simply constructed, light, wooden frame. It was found that, though several crops including celery, carrots and beets matured seed satisfactorily under this covering, the total production of seed was considerably less than that produced by plants grown without a cotton covering. Certain crops, particularly the cabbage, produced no seed at all when covered and produced a fair crop of good seed if grown in the open. It may be surmised from these results that the pollen of cabbage in particular is carried from plant to plant by insects and not by the wind.

In growing the seed of root crops care should be taken in the first place in selecting roots that are uniform in shape, typical of the variety that they represent and in sound mature condition. With such roots as turnip it is advisable to twist rather than cut off the tops when storing, for by cutting off the tops too near the crown of the root, one is liable to remove the eyes from which the flower shoots grow in the spring. With beets and mangels this is not so likely to occur, as the eyes are deeply set. Such roots, after they have been selected, can be stored in either a root cellar or pit. The pit is often the more convenient as it can be made in a corner of the root field.

In pitting roots the pit should be so constructed as to afford a dry bottom, good drainage and good ventilation. Successive layers of straw and soil should cover the roots. Straw drafts along the top of the pit should be made for ventilation and such precautions as possible to keep rats and mice from making the pit their winter quarters.

Seed of certain market garden crops stand at a high figure such as the seed of Paris Golden Yellow Celery is quoted an example of the present market quotation of many of our seeds, and judging by the experimental work in our small trial lots during the past unfavorable season at Ottawa, it seems to me that there is an excellent opening for many a man with a good practical knowledge of market gardening and a realization of the essential factors in seed production to initiate and ultimately build up an exceedingly profitable business in home seed production.

It is is an indisputable fact that acclimatized seed produces better results nine times out of ten than similar seed introduced from distant countries. By the term "seed" I refer strictly to seed, not to roots, scions or cuttings, though even in these instances there are many examples of the superiority of home grown stock. The exception that I have in mind is that of potatoes, but a potato is nothing more or less than a root cutting.

Sweet corn is another crop that is particularly worthy of attention by Canadian growers. The majority of our sweet corn seed has been and is produced in areas to the south of us, which possess longer summer seasons than our own.

The continual importation of seed year by year excludes the possibility of ultimately acclimatizing and appreciably shortening the season of growth of these varieties. At the same time it also precludes the possibility of producing earlier maturing varieties than are generally found on the market.

Sweet corn seed has been successfully matured, improved and selected at Ottawa for a number of years past. If this can be done as far north as Ottawa with our comparatively short summers, similar work can be carried on throughout the whole Province of Ontario, and if the growers would only take this matter up, even in a small experimental way, the old adage, "Many hands make light work" would produce wonderful results within a few years time.

Owing to the quantity of field corn grown for general horticultural purposes, the areas selected for the growing of sweet corn seed should be distant from field corn by about four to five hundred yards, as corn intercrosses very readily, owing to the fact that it produces enormous quantities of light powdery pollen that is carried by the wind. Sweet corn that has been pollenated by field corn can be readily isolated in the ear of grain, but such segregation of seed greatly increases the cost of production, and tends to introduce factors that will ultimately destroy the pure type of the variety.

Corn can be covered with light factory cotton, provided the screens are not placed too close around the plants, affording a fairly free circulation of air, but, if the grade of cotton be too heavy or the enclosed corn too confined, the pollen seems to lose its vitality and practically no seed is produced. At Ottawa seed has been successfully secured in breeding cages made of a light grade of cotton, but in a number of instances no seed at all was secured when the grade of the cotton was a trifle too heavy.

Another crop from which a considerable quantity of seed has already been saved (but the amount might easily be doubled or trebled), is that of the tomato crop. Tomato seed is easily extracted from ripe mature fruits, by passing the pulp through a quarter-inch mesh screen, thereby removing the coarse cores and skins and breaking up the texture of the pulp containing the seed. If the pulp is then stored in glass bottles until slight fermentation has set in, the seed can be cleanly separated from this pulp by washing it with a stream of water on a screen of 1-12 inch mesh. The size of this mesh is that of the ordinary netting used on fly screen doors and is large enough to allow the fermented pulp to pass through and hold the seed on the top of the screen. By this method a quantity of tomato seed has been saved during the past three years at the Central Experimental Farm in Ottawa.

Experiments with varieties of lettuce, C.E.F., Ottawa.

I consider the production of seed of many of our crops a practicable possibility to many men who are willing to tackle a new problem, remembering that not only is the production of seed necessary, but the production of pure seed. Any men doubtful about how to proceed with regard to any particular crop could, I feel sure, secure such necessary information from either Guelph or Ottawa. If not already acquainted with the fundamental botanical laws of production, by combining practice with theory, I see no reason why such effort should not be well repaid.

PROF. CROW: I should like to hear the experience of market gardeners who have greenhouse space available and put celery plants in in the fall. We put ten plants in last fall, five of them died, but the other five yielded a total of one pound of seed from the five. This was Paris Golden.

PROF. MACOUN: It would be profitable if we could get to the point where we produced our own cauliflower seed. Cauliflower is very expensive, too, and I would not be surprised if we could not grow some in greenhouses the latter part of winter or in the early spring. I want to read to you a letter from Dr. Malte, Dominion Agrostologist, and a clipping from a Swedish newspaper which he sent to me:

"I beg to enclose herewith extract of an article published in a newspaper of Gothenburg, Sweden, October 2nd, which I feel sure will interest you. The article refers to action taken by the Board of Directors of the Agricultural College of Alnarp, Sweden, asking for a government grant for the encouragement of vegetable seed growing:

"'The Board points out that the war has most clearly emphasized the importance, for the country, of home production of vegetable seed. Owing to the most important vegetable seed producing countries having prohibited the export of such seed, the prices of a great number of important vegetable seeds have risen enormously. And, still worse, some seeds can hardly be obtained at any price. It is reported, from a well informed source, that vegetable seed growing in the countries engaged in the war has been largely neglected during the past summer and that for this reason further advances in prices can be expected. Reports from Germany state that the supply of seed of spinach, carrots, most kinds of cabbage, onions, cucumbers and peas is utterly small. Furthermore, Germany has prohibited the export of vegetable seeds to the end of the war. There is, therefore, every reason to fear that we have to face the possibility of a very serious shortage of certain vegetable seeds.'"

You will be interested also to know that vegetable growers around the City of Victoria on the Vancouver Island are very enthusiastic about the growing of vegetable seed on Vancouver Island. The climate there permits of cauliflower, cabbage and celery being left out all winter. The lowest temperature they had last winter was 24, and that was only for a day. The last week of March I saw potatoes six inches high. So you can see the wonderful possibilities of their climate there. They could grow things that we could not grow, but we can grow a great many seeds here. Dr. Malte has published a Bulletin, No. 22, on Growing Field Root, Vegetable and Flower Seeds in Canada. This contains some good hints on seed growing, and we are trying all the time to bring together information from all the sources that we can.

THOS. DELWORTH: I received last year a sample of peas. I sowed them and I do not think I ever saw peas which showed such strong germination or so true to type. One sample was the English Wonder (I have forgotten the other name). It was very true to type, a heavy cropper, but it had a small pod. I think that for peas for canning factory purposes that would be just the type, but if you have got to pick them one pod at a time, you would have to pay so much for the picking that there would be nothing left for the market gardener. The peas were good, true to type, showed strong germination, but only one point was overlooked, namely, they were too small in the pod for the market gardener's purpose.

PROF. MACOUN: The pea was MacLean's Advancer. We appreciate your criticism, and are always glad to get reports on the seeds. Now take the Surprise Pea, we have been growing about twenty years at Ottawa, it is just as productive as any of the early peas, that we have got, and the private individual can ripen his peas, if he has a small plot, so that he can get enough for his garden next year. But what we are after particularly, we want to get from the vegetable growers, their standpoint. We are trying to get as good quality as possible, because the majority of people want that if they can get it; sometimes the most productive are not the best quality. If we can get something that will please both the consumer and the market gardener, that is our aim.

THOS. DELWORTH: When I went over the grounds at Ottawa with Mr. Logsdail, he showed me one that he grew last year. From the market gardener's standpoint it is the best I have ever seen. It is called "Southern Excelsior."

A. J. LOGSDAIL: All we ask is a genuine criticism of our work. Just show us your idea, and we will do our best along that line. About two years ago, as Mr. Delworth was saying, I showed him our English MacLean's Advancer, and he commented on the size of it, and he also said it was not the type of pea that the market gardeners grow. We have done a lot of work trying to isolate individual plants and varieties to see which variety yielded the most peas under all conditions. and English Wonder, the American Wonder, and MacLean's Advancer were at the top, and there is no variety we have tried that can come closer. I came to the conclusion that what was wanted generally all around was a great big pea with a large pod, and I have a whole bed out, but, of course, the results are in the future still.

PROF. CROW: Mr. Delworth's criticism is certainly not untimely, and we appreciate his views on this subject. However, it is obvious that a standard of variety type is urgently needed. I do not know how this should be obtained, but if any of the experimental stations had the money to spend and would undertake the publication of literature similar to that published by the fruit associations of New York. if we could have standards for the various vegetable types—I mean to say a standard description, we would know what the standard type is. There is this difficulty with so many of us growing our vegetable seeds and perhaps growing the same varieties, we will have a great many varieties, and we should certainly exercise all possible care to get the exact variety type, and if we could find some means of establishing a national or international standard, we would be aiming at a mark that would be well worth reaching.

HOWARD W. SELBY: You are coming to a point we have arrived at in vegetable growing. We have a committee on seed nomenclature which has been working for two or three years, and within the past six months the Seed Trade Association of America in convention at San Francisco, appointed a committee to work in conjunction with our association committee. They have work before them which will possibly take five or more years, but they are working to standardize the names of the different varieties of seeds. At the present time we are buying a certain variety from one seed man and another one comes along with one by a totally different name, but which after we have tried it, simply proves to be the same thing. For instance the Boni Best Tomato has about six or eight different names. I believe that that difficulty is to be solved by our Association in America. and on that score, too, we need your closest co-operation.

J. W. RUSH: My idea is that the vegetable grower is looking for a pea that will produce a pod equal in size to the American or English Wonder. Then we will have something that is worth the grower's putting on the market, but no vegetable grower can afford to grow these small peas. It takes too long to fill the measure for the price that they receive.

REPORT OF VEGETABLE SPECIALIST

S. C. JOHNSTON, TORONTO.

In order to extend the instruction work among vegetable growers in various sections of the Province it was found advisable to hold a few meetings for those specially interested in the growing and marketing of vegetables. In working out this idea the principle which was followed was to make the meetings, or conferences as they were called, of a mutual benefit nature. To make this possible it was determined to secure speakers who had made a specialty of some particular line of vegetable work and have these men speak to the vegetable growers in other sections where this information would be of value. Speeches were delivered by competent men thoroughly familiar with the conditions whereof they spoke, and discussion was always encouraged. These conferences were held in four districts during the month of March, 1915.

The attendance clearly demonstrated the plan as a success, over 300 growers being at the Toronto meeting. I am satisfied that this method of imparting information to the vegetable growers is worthy of considerably more attention.

BACK-YARD GARDENS.

For several years there has been a movement in the large cities and towns of the Province toward encouraging more or less thrift and independence among the working men. During last winter much was done along this line in various cities, and during the past summer back-yard gardening made, probably, greater advances than ever before. Men, women and children of all ages and vocations received sufficient information to become enthused with the thought of growing something for themselves, whether from a sense of the need of thrift in these times of war, or merely from a sense of pleasure in accomplishing something out of their regular lines of work. Many who had previously been buying vegetables from hucksters' waggons passing the door have grown vegetables for themselves for the first time. They have saved considerable money for themselves, but the greater result has probably been in the vast improvement to be found in the various cities and towns in Ontario. To the promoters of this work considerable credit is due, and it is certain that the idea will not die out for many years to come.

To gather some definite information regarding the extent of vegetable growing in these back yards it was deemed advisable to make a survey of various towns and cities in the Province. The District Representatives of the Ontario Department of Agriculture were asked to visit five consecutive houses on ten different streets and make inquiries as to the size of the plot devoted to vegetables and to what extent the industry was carried on. The replies have been worked out on a percentage basis and the following figures may be of interest:—

33 Counties.

Number received	1,451
Per cent. that grow vegetables	79
Per cent. started growing, 1915	12
Average longest period grown	32
Average number of years	7
Per cent. raising sufficient for summer	61
Per cent. raising sufficient for winter	2½
Per cent. having surplus for sale	13
Per cent. desiring information	25

From these figures the vegetable growers of the Province will find very little room for the feeling which has been expressed by some gardeners that back-yard gardening should not receive as much attention and encouragement, because it was taking away their means of livelihood. From the foregoing statistics we find that a very low percentage have commenced growing vegetables this year, that the average number of years during which vegetables have been grown covers well the last period of high prices for the professional vegetable grower. The percentage growing sufficient vegetables for winter use is practically nil. My deductions from these figures, and from personal conversation with those who have grown vegetables in their own yards for some time, is that the vegetables grown in the yard give the householder a desire for more of a superior quality. He has formed his own opinion of what can be grown, and he demands this on the market. He will and does pay a high price for a vegetable of a quality similar to those grown in his own garden. His space is limited, and, as his appetite for fresh vegetables will increase over his own output, he must needs buy from the vegetable grower. The discrimination shown by the consumers in buying in the stores in our cities or from professional growers can be traced to some extent to the growing of vegetables in the back yard, and this discrimination shows that the consuming householder is studying more carefully what he is buying and is willing to pay for the first-class article.

CELERY BLIGHT.

The work commenced in 1914 on the control of Celery Blight has been carried on successfully again this past season in spite of the extraordinary wet weather, which in some cases made it practically impossible to thoroughly spray each week. The services of an assistant, W. M. Anderson, were secured, and he devoted practically all the summer to giving instructions and advice on the spraying of celery. Demonstration patches of celery were selected and sprayed throughout the season in the following districts:—

Thedford, one; London, three; Hamilton, one; St. Catharines, one; Burlington, one; Toronto, six; Kingston, one, making a total of 14 plots, covering approximately 35 acres.

Meetings were held and the celery growers invited to come and see the results and discuss the spraying, etc., thoroughly. No change has been made in the amount of materials used from directions given last year at this convention—

4 lbs. copper sulphate.
4 lbs. lime,
40 gallons of water.

The main difference between this season's work and that of 1914 was the extra number of applications necessary owing to the excessive wet weather.

Results this year have been uniformly good. Several patches of from 3 to 4 acres in size have been kept practically entirely free from blight, so free that no heads were unfit for sale. Other patches which suffered severely from overflowing rivers and deluges of water are not of as good quality and yet the spraying certainly proved entirely satisfactory on these gardens, judging from the check rows.

Many of our demonstration plots were so wet that it was impossible to drive a horse over the ground for over two weeks. This gave the blight a chance to get a foothold, and only by constant spraying could it be held in check. One grower in such a predicament secured a knapsack sprayer and sprayed his quarter acre plot with this. He was diligent and sprayed after every rain, aiming to keep the plants covered with the mixture. He sprayed up one side, down the other and back over the top of each row, thus making three sprayings on one row. He did this as often as four times in one week. As a result he was able to sell every stick of celery from his plot at a high price, and not more than ten heads had any of the leaves affected with blight. This spraying with a knapsack cost, for time and materials, at the rate of $30 per acre.

In spite of unusual conditions the plots of celery which were carefully attended to from the seed bed until time of digging gave a striking result of spraying celery. The plots in Toronto district are among the few from which celery could be sold throughout the past season. The sprayed celery always could be handled at a high price, when the unsprayed, blighted celery could hardly be given away at any price.

It is hoped this work will be carried into new districts this coming season.

Onion Blight.

Onion Blight has gradually become more and more prevalent in the Province during the last eight or ten years. Starting in a few localities, its ravages have not seriously affected the onion crop in Ontario until this season. The experience of the American onion growers has been in some localities that something must be done to control this disease because of the great damage it does in such a short time. Onion blight has had very favorable climatic conditions for its growth and development, consequently we find an enormous amount of loss through this one disease alone. Wet weather, especially close and muggy weather, is most favorable to the growth of onion blight, as is the case with most fungus diseases. Some districts of the Province have been more favored than others. However, the district of Cataraqui, near Kingston, has the unenviable position of being attacked with onion blight practically every season whether wet or dry. It has not been determined why this locality should be so liable to this disease, but I am of the opinion that the Kingston vegetable growers have to contend with more fungus diseases than in any other districts in the Province. It was planned this year to carry on some experimental work with a view to determining if possible some remedy which would be practical, and either prevent or cure onion blight.

Bordeaux mixture has been recommended as a preventive, but so far as known this mixture has not been used for this disease to any extent in Ontario. The experimental work was carried on in the garden of Mr. John Baker, of Cataraqui, near Kingston, Ontario. Unfortunately, the blight struck the onions in this district this season two weeks earlier than has been customary in past years. We were unable to apply our spray mixture until after considerable damage had been done, and it was impossible to keep the spray on the plants owing to the continued downpours of rain. Each time the spray was applied a heavy rain would follow and wash all the spray from the leaves, and the ground was so wet it was impossible to follow up with another spray at once. Bordeaux mixture was applied for some five consecutive weeks, and, yet, owing to the above reasons, no favorable result was obtained. So far as could be seen, no influence as to the effect of the spray could be determined on this crop. However, in spite of a failure to give results under the most unfavorable conditions, and judging from results obtained in other countries, I am of the opinion that by a more diligent application of this mixture good results can be obtained. Furthermore, considerable experimental work will have to be carried on to determine certain factors which influence the work on onions. Some of these which are in mind for future work are as follows:—

(1) When should spraying be started? When the plants are young or just before the usual time for blight to strike the onion, which generally is July 1 to 15?

(2) What machine can be best used in an onion field where the rows are 14 to 15 inches apart?

(3) Is it necessary to use any stronger solution for onions than for other crops?

(4) Is it necessary to use a resin or a soap sticker to get satisfactory results?

These points are those on which most attention will be placed with regard to any work carried on with this disease.

LETTUCE DISEASES.

Some work has also been started to find some means of control for a disease in outdoor lettuce which attacks the plants in the summer months of July and August. The plants thrive until they are about half grown and then the leaves commence to wither and fall. A whole area of outdoor lettuce soon succumbs to this disease. Experimental spraying of lettuce from its early stages until maturity failed to give any result this season. It is hoped to continue this work in the hope of securing more information with regard to either prevention or control of diseases in lettuce.

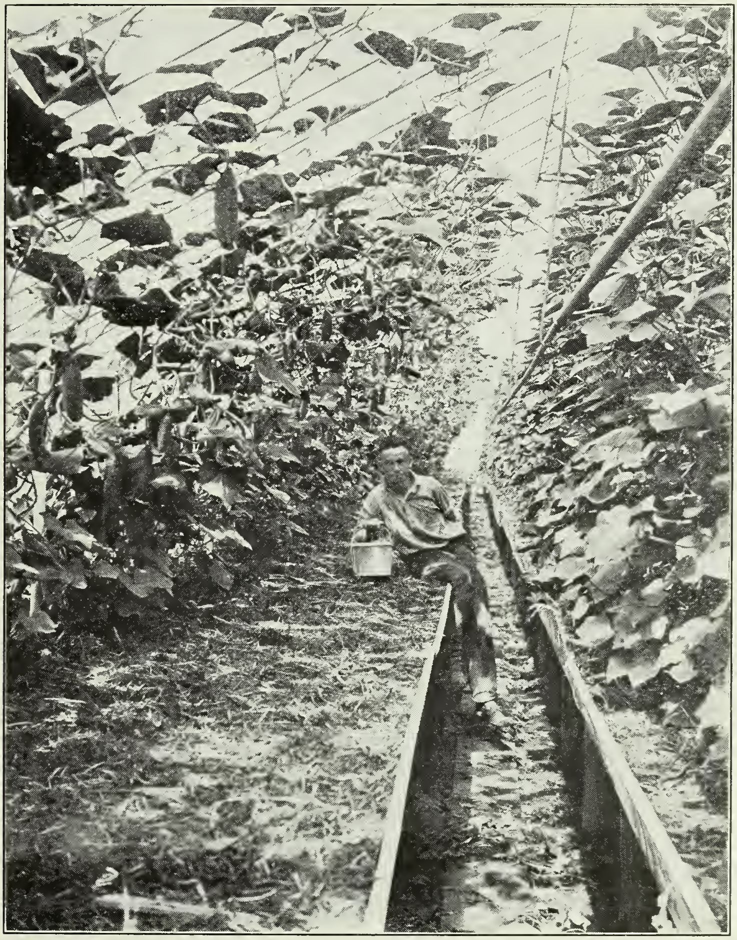
PELEE ISLAND EARLY TOMATOES.

Pelee Island is in Lake Erie, some 18 miles by water from Leamington, in Essex county. It consists of approximately 14,000 acres of land which has been yielding heavy crops for many years. Very few vegetables are grown there. Its season is about two weeks earlier in the spring and about the same length of time later in the fall than at Leamington on the shore.

To determine, if possible, if this advantage of two weeks' earliness in the spring could be put to some economic use and make the Island produce early tomatoes, a demonstration plot of these was placed on the farm of Mr. Frank Harris. This work was carried out with the able assistance of Mr. John Noble, District Representative for Essex. Well-grown plants in seven-inch veneer bands were secured from one of the Leamington growers and taken over to the Island and planted two weeks before any plants were set out in the Leamington district, which is the earliest in Canada. They were planted on ground which had grown corn the previous year and was ordinary farm land, having been given only bare preparation for such a crop as tomatoes. They did not suffer from the severe frost which played such havoc in the Leamington district last spring. The plants grew beyond expectation and the crop of fruit would be a credit to any district in Ontario which gives the most exacting care and attention to growing early tomatoes. With respect to earliness, the tomatoes from Pelee Island compared very favorably with those grown in the Leamington district. The crop of extra early ones would compare very well with any grown on the shore. It has been claimed also that the flavor of the tomatoes grown on the Island is superior to that of those grown anywhere in Ontario. From our work this year we are convinced that with selection and care of soil early tomatoes can be grown on Pelee Island which will be ready for market at least one week earlier than those grown on the mainland in the Leamington district; that Pelee Island could, with some changes in the transportation facilities, become a valuable adjunct to the Leamington early tomato-growing district and so help to further the slogan "Made in Canada" with regard to extra early tomatoes for Ontario and Western Canada markets.

COST OF PRODUCTION.

Very little work has ever been done with regard to the cost of production of vegetables. No two growers give exactly the same attention to the same crop, and we are led to believe that there is some limit to the cost of profitable production, but as yet it cannot be stated that an average acre of vegetables grown by a professional market gardener costs approximately a certain amount of money. Our friends the fruit growers have determined in many instances the cost to a fraction of a cent of picking, packing and producing a box of apples. Their figures differed widely when this was first commenced, but at the present time they have a standard which varies more or less, depending on local conditions, and this standard has helped to create a system among the fruit growers which assists them to produce an article of quality for the lowest possible price. This cost accounting is a line of work which was considered to be of great value to the vegetable growers of Ontario, and a start was made this season with the hope that in a few years considerable information could be distributed and discussed on the subject. Mr. F. F. Reeves,



Hothouse cucumbers. The prunings from the vine are seen on the walk.

of Humber Bay, kindly consented to keep a memoranda of the time spent on the various operations necessary to bring a quarter of an acre of onions and a quarter of an acre of early potatoes ready for market. Mr. Reeves' garden is between five and six acres in extent, and is similar to many of those in the Toronto district. One-quarter of an acre was chosen, because it is a reasonable average of the quantity grown by many gardeners in the Toronto district.

The value of the land on which these crops were grown was not taken into consideration because of the fluctuation of the real estate market at the present time, and because it plays no part in the actual cost of production in so far as the operations necessary to cultivation, etc., are concerned. Land worth $150 per acre may produce as good a crop of onions as land valued at $2,000, and yet the cost of the cultivation, etc., may be considerably higher or lower, depending on local conditions.

Following are the actual costs of producing a one-quarter acre of onions and potatoes:—

ONIONS.

(Fertilizer applied by hand).

April 12.—3 hours, one man.
“ 13.—Disking and harrowing, 2 hours, man and team.
“ 14.—Drilling in, 2 hours, one man.
May 20.—Weeding, 20 hours, one man.
“ 28.—Wheel hoe, 3 hours.
June 5.—Wheel hoe, 3 hours.
“ 13.—Weeding, 5 hours.
“ 26.—Weeding, 6 hours.
July 10.—Hoeing and weeding, 10 hours.
“ 18.—Hoeing and weeding, 6 hours.
Sept. 3.—Pulling, 20 hours.
In rows 14 inches apart.

Onions were planted on clay loam which had been given ten team loads of manure per ¼-acre. From this one-quarter of an acre the yield was 165 bushels.

Cost of actual cultivation is as follows:

Man's time, 80 hours at 20c. per hour	$16 00
Horses' time, 2 hours at 30c. per hour	60
	$16 60

POTATOES.

April 23.—Man and team, disking, 2 hours.
“ 27.—Butting potatoes, 1 man, 3 hours.
Planting and covering with hand rake.
Planted by hand, right side up, 5 hours.

May 15.—Harrow, both ways, 1 man, 1 team, 1 hour.
June 1.—Scuffle, 1 man, 1 horse, ½ hour.
“ 9.— “ “
“ 21.— “ “
“ 23.—Hoeing, 1 man, 3 hours.
“ 26.—Moulding, 1 man, 1 horse, 1 hour.
July 5.—Bugs, 1 man, 3 hours.
“ 18.—Bugs, 1 man, 2 hours.

Cost of actual cultivation operations are as follows:

Cost of digging apparatus	$5 00
Man and team, 50c. per hour, 3 hours	1 50
Man, 20c. per hour, 17 hours	3 40
Man and horse at 35c., 2½ hours	88
Paris green, 2 lbs. at 25c.	50
	$11 28

CONDITIONS.—These potatoes were grown on clay loam soil in rows 30 inches apart. The sets were planted by hand 7 x 9 inches apart with the sprout right side up. They were covered by a hand rake. The yield from this quarter of an acre was 140 bushels.

SEED GROWING.

Considerable interest was aroused at last year's convention with regard to the production of home-grown vegetable seed in Ontario. To encourage home-growing of some vegetable seeds and to determine the approximate cost of operations and yield of seed it was decided to attempt the growing of onion seed in the onion-growing district of Leamington. Onion growers there rank with the best for the quality and quantity of their output, and why should not some of them go a step farther and grow seed for distribution in other parts of Canada, instead of depending on seed of unknown quality, secured from seed-growing centres in the United States. If onion seed could be grown satisfactorily in Leamington which would produce onions just as good as seed from seed-growing centres in Ohio or California, Ontario growers would be willing to pay a good price for it and at the same time keep the money in Canada. Mr. Jos. Ainslee, of Leamington, was satisfied that the venture was worth trying, and we were enabled to carry on some work with him which will help us in the future to increase the production of home-grown onion seed. Nearly 100 bushels of Yellow Globe Danvers onions were carefully graded and planted, approximately one acre of land being used. They were carefully selected as to type and graded with three sizes, large or select, medium, and small. These were planted in rows five feet apart and the bulbs placed eight inches apart in the rows. These were carefully attended, scuffled and moulded up during the season and prospects were for a good crop of onion seed. Unfortunately, the wet weather and blight practically destroyed the crop in less than a week. However, several points of interest have been noted, and we now have a good foundation for future work in this line. The most important of these is that the grade, large or select, gave the best indications of a crop of seed. The seed stalks were more in number, stronger, and the seed balls were larger and more evenly filled out than in either of the other grades. The small grade, when compared with the select grade, was fully fifty per cent. less in quantity of seed. It is hoped that this work will be carried on more fully in later years. It will be practically impossible to do so in the coming season because the quality of onions from which one would select seed stock is not up to standard. However, those who have seen this seed-growing plot are of the opinion that onion seed of a first-class quality can be grown to advantage in the Leamington district.

CABBAGE ROOT MAGGOT.

The cabbage root maggot has been one of the worst insect pests with which early cabbage and cauliflower growers have had to contend. Numerous inquiries from many sections of the Province led to the following work being carried on in the London district through the able assistance of Mr. I. B. Whale, District Representative for Middlesex County, on the garden of Mr. Geo. Bycroft, of Byron, and in the vicinity of Weston on the garden of Mr. Thos Delworth. The following experimental work was carried on at London, approximately 2,000 plants being treated with the following mixtures:

Paris Golden, White Plume, Rose Ribbed Paris and Evans' Triumph, grown in a Toronto back garden, all of which won first prizes.

(1) Corrosive sublimate, 4 ozs. dissolved in 40 gallons of water, applied at the rate of half a cupful to a plant with a water-can.

(2) Moth balls—4 placed in the soil at the base of each plant.

(3) Carbolic emulsion, made by boiling one-half pound of common soap in one-half gallon of water until thoroughly dissolved, adding a tablespoon of Gillett's lye, and pouring in slowly one pint of crude carbolic acid. This solution is made up to forty gallons and applied by a water-can.

(4) Tar-paper disks placed at the root of each plant.

(5) Oil of tar dissolved in wood alcohol and diluted with water and applied with a watering-can.

This work was commenced the day the first eggs were seen (May 11th). Careful attention was given for a period of five consecutive weeks. All cabbage, irrespective of treated or untreated rows, were harvested, and the quality was excellent. One observation worth noting was that a small plot of vetch close to the cabbage plot was badly infested with cabbage root maggot and practically destroyed.

On the plot in Mr. Delworth's garden approximately 3,000 plants were treated. Only two materials were used here, tar-paper disks and corrosive sublimate. The experiment was carried out in triplicate with Skinner irrigation and without.

The following results were obtained for the first year:

Corrosive sublimate, loss less than 1 per cent.
Tar-paper disks, loss 5 per cent.
Check rows, loss with water, 60 per cent.
Check rows, loss without water, 100 per cent.

Four ounces of corrosive sublimate were dissolved in forty gallons of water. The solution was applied with a water-can once a week for five weeks. Cost of materials for 1,000 plants treated with corrosive sublimate:

7 four-ounce packages of corrosive sublimate at 12½c. per oz....	$3 50
5 hours' time (one hour per week) for man at 20c	1 00
Total for materials and time	$4 50

Tar-Paper Disks.—Commercial tar-paper disks were secured from Rochester, N.Y., and were placed around the plants at the first sign of eggs.

These had to be taken off and replaced after each hoeing or scuffling, as the earth was thrown on top of them, destroying the influence of the tar-paper.

The cost of treating 1,000 plants with tar-paper disks is determined as follows:

1,000 disks at $2.00 per M, plus duty and express	$3 75
Time of adjusting, replacing and cleaning 1,000 disks for 5 weeks at rate of 2 hours to place 250 disks—40 hours at 20c. per hour	8 00
Total cost materials and time for 1,000	11 75

This gives a difference in cost of $7.25 for the treatment of the same number of cabbage for the whole season.

The quality of the cabbage treated with either corrosive sublimate or tar-paper disks was 50 per cent better than those plants which survived in the check rows.

Nothing further need be stated. One year's work has been carried on and the results have been far beyond expectations. Further verification of these results will be carried on next year.

Green Aphis.

Probably no insect caused as much damage in vegetable crops this season as the green aphis or green fly, or, as commonly called, green lice. It occurred in vast numbers in several sections and caused considerable damage to crops of celery, lettuce, beets, carrots, parsnips in particular. As this is a sucking insect a few hundred of them on a small celery plant very soon caused considerable damage, and in some under observation cases these insects so injured the foliage that the plants were permanently stunted, thus causing practically a total loss of the season's crop.

Although no plans were made to control this insect the damage it was doing determined that some remedy must be found. In several districts vast numbers of these green aphids were destroyed. Two forms of tobacco were used for this purpose, as follows:

(1) One pint nicotine; 50 gallons water.

(2) Solution of tobacco water resulting from soaking one pound of tobacco stems in one gallon of cold water for 24 to 48 hours.

The first solution is a commercial tobacco extract known by many greenhouse men and can be secured from seed merchants. This costs, this year, $1.75 for a pint bottle. An ordinary celery or potato sprayer was used, and two applications three days apart cleaned the celery patch. One 50-gallon barrel was sufficient for one acre of celery.

The second solution mentioned can easily be made by securing a large barrel and placing in it one pound of tobacco stems for every gallon of water. Twenty-four to forty-eight hours' soaking gives a tobacco water sufficiently strong to kill green aphids, although it is not so good a remedy as the commercial tobacco extract. This costs practically nothing, as the vegetable growers usually secure tobacco stems for the asking.

IN MEMORIAM—M. F. RITTENHOUSE.

Moved by Thos. Delworth, seconded by J. W. Crow. "That the Ontario Vegetable Growers' Association, in convention assembled, learn with deep regret of the demise of the late Mr. M. F. Rittenhouse. This Association desires to place on record their sense of deep appreciation of his splendid personal qualities and of his generous and intelligent interest in the horticulture of this, his native Province." Carried.

TOMATO BLIGHT.

D. H. Jones, Professor of Bacteriology, O.A.C., Guelph.

Blight is a term somewhat loosely applied to various diseased conditions of plants. Many fungus diseases and many bacterial diseases of plants are referred to as "blights," and even bad insect attacks of plants, as for instance infestation by aphids are sometimes referred to as attacks by the "blight." As a result some confusion of ideas is liable to ensue in a discussion of a diseased condition of any plants unless some more specific term than "blight" is used in connection therewith. Hence, when I was asked by Mr. Lockie Wilson to address you on tomato "blight," I did not know for certain just what disease of tomatoes was implied or whether the term included several or all of the diseases affecting tomatoes that have so far been investigated and described. However, I eventually came to the conclusion that what was wanted was a presentation of results from the investigation of the diseased conditions of tomato plants that Prof. Howitt, Dr. Stone and myself have been making from time to time during the last eighteen months or so.

This disease was first brought to our notice in the spring of 1914. At that time Prof. Howitt received a consignment of diseased tomato plants from a grower who complained of considerable losses from this disease in his tomato crop under glass. His winter crop had suffered and the disease was affecting his spring crop. In both these crops the disease affected individual plants scattered here and there throughout the crop.

Prof. Howitt sent me a portion of the plants for a bacterial examination. At first sight, the lesions from the stems appeared identical with those of the disease known as *Brown Rot of Solanaceæ,* a bacterial vascular disease affecting the potato, tomato and egg plant. Microscopical analyses of affected tissue, however, failed to show any bacteria. A number of bacterial cultures were also made in various culture media, but only a few bacterial colonies developed and these proved on examination to be non-parasitic. I was a little surprised at these negative results for the vascular system of the affected parts looked so much like the vascular system of the tomato, potato and egg plants suffering from the Brown Rot of Solanaceæ, which was shown by Dr. Erwin Smith and others to be due to a bacterium—*Bacterium solanacearum.* With this disease, however, the casual organism is present in the vascular system in large numbers and can readily be seen in miscroscope preparations made from affected vascular tissue and will grow readily in the common culture media used in the cultivation of bacteria.

Prof. Howitt and Dr. Stone at the same time made an extended examination of the affected tissues for parasitic fungi which might be causing the trouble, also with negative results. Some of the plants were then sent to Dr. Erwin Smith at Washington, who first described the Brown Rot of Solanaceæ and had conducted many experiments with it, and to Prof. Selby of Ohio, who had published a short account of a tomato disease, the description of which was somewhat similar to the disease in question. These men reported similar results to those we had obtained. Later a second lot of affected plants were sent to these men at their request, and their reports on this second lot were a duplicate of the first. Hence we are forced to the conclusion that the disease was not any of those the cause of which had been established as either bacterial or fungoid.

In the fall of 1914 the grower who had complained of the disease in his previous season's crops reported the loss of practically his entire crop in one house containing about 5,000 plants. It was learned also that tomato growers in the vicinity of Philadelphia had given up growing tomatoes because of the heavy losses caused by a disease that appeared to be similar to this one.

In June, 1915, a visit was paid to the house where the disease had been so disastrous, and to a few other houses where its presence was reported. A few isolated cases only were found. These were carefully observed and the following is a description of the lesions on affected plants.

APPEARANCE OF THE DISEASE.

(Observations of the disease in tomato plants seen in houses near Hamilton and Toronto, June, 1915.)

The lesions of the disease apparently may show first on any part of the plant, but usually it begins in the younger tissues of the plant where growth is taking place. If it occurs when the plant is young it is most serious; the vigour of the plant is impaired in proportion to the extent to which the disease develops: the plant is usually stunted, the leaves affected shrivel up, little if any fruit is produced and this is of inferior quality, or the plant may dwindle and die. If the disease first develops when the plant is well grown, it occurs mostly in the younger issue, the yield of fruit is much curtailed and of inferior quality.

1. Lesions on Fruit: Lesions on the fruit appear to begin as small indentations of the epidermis. They may occur on any part of the surface. There may be one or several lesions on a fruit. They may be irregularly circular or irregularly linear. They assume the latter form more frequently than the former. With time they enlarge and where a number of lesions occur on a fruit they frequently become confluent. Young lesions are yellowish in color and later usually become brown and opaque. They have somewhat the appearance of a burn or a scald. Frequently the lesions are confined to the surface and only the epidermis apparently is affected. Occasionally, however, especially in advanced cases section shows the brown discoloration to extend into the subjacent tissues to a greater or less extent. Such tissue appears to be dead and the epidermis is subject to crack open and if tomatoes with such lesions are picked and kept for a few days, various saprophytic molds are liable to develop in them. In some cases examined it looked as though the disease after having developed on the growing fruit had gradually worked backwards down the stem.

Vegetable garden.

2. Lesions on the Stems: Lesions on the stems, peduncles and pedicles appear as brown, shrunken areas. They may occur on any part, be numerous or few, separate or continuous. As with the fruit the epidermis alone may be affected, but more often than is the case with the fruit, the affection penetrates the underlying tissues giving them a brown discoloration, causing them to shrink and frequently to form cavities. Frequently the vascular bundles are blackened, such discoloration being sometimes continued in these bundles beyond the general outlines of the affected area.

3. Lesions on the Foliage: The lesions on the foliage are very like those described for the fruit. In outline they may be said to resemble at first the burrowings of a leaf miner. They become dark brown in color, dry and spread until much and sometimes all of the leaf is involved, dries up and shrivels. They appear first on the younger growth, increasing in area as the leaf develops, and cause malformation and shrinking of development.

AFFECTED FRUIT AFTER BEING PICKED.

When affected fruit of any stage of development is picked and is kept for a few days, or even weeks, the lesions do not extend in any direction beyond the point to which they had developed at the time they were picked, except in cases where the epidermis was ruptured and saprophytic molds or bacteria had found entrance. Then of course the usual degradation of decaying tissue takes place. There is the same absence of further development of lesions in the stem, branches or leaves of plants that have been removed for examination. The ripening of affected fruit after it has been picked proceeds in a normal manner except in the parts affected where the development remains apparently stationary. The unaffected part of the fruit develops the normal red semi-transparency of the ripe tomato while the lesions, if of recent development, will remain a greenish yellow or if further advanced to the brown stage at the time of picking they will remain brown.

Various saprophytic molds develop where the epidermis has been broken on the lesions of the fruit, stem and foliage, when such material is kept covered in glass jars or dishes. Among those observed, the genera Cladosporium, Penicillium, Botrysporum, Aspergillus, Macrosporium and Mucor were represented. These are all saprophytic molds and will grow on most dead organic tissues, but will not induce the disease.

SECOND SERIES OF EXPERIMENTS.

Portions of diseased plants observed near Toronto and Hamilton in June were brought to the laboratory for further examination. Bacterial plate cultures were made from affected stems and fruit both external and internal diseased tissue being used as inoculum. Some bacterial colonies developed in each case, but these were not in sufficient numbers to warrant them being considered as the cause of the disease. However, six colonies were picked off and grown in pure culture for inoculation tests. For this purpose twelve tomato plants about twenty inches high, growing in pots in the greenhouse were selected and these were heavily inoculated in duplicate in stems and foliage from each of the cultures isolated.

Result: No signs of the disease developed in any inoculated plant at any time later.

In the meantime Dr. Stone had been conducting a series of experiments to find out if the trouble could be traced to the soil.

In November, 1914, he obtained some seed from the grower who had suffered so heavily from the disease. This was from the same lot of seed as was used for the crops which became diseased. This seed was sown in three plats of college soil.

He then obtained soil from the beds where the disease had been prevalent. This was filled into pots and half of these were sterilized in the autoclave, steam pressure at fifteen pounds or 250 degrees F. for one hour. Other pots were filled with college soil. He thus had three lots of soil in pots: I, College soil: II, Diseased soil not sterilized; III, Diseased soil sterilized. Into these pots he transferred the seedling tomatoes.

Results:

In College soil plants all remained healthy. In diseased soil not sterilized some plants were killed by rhizoctonia—damping off. (No signs of the disease being investigated.) In diseased soil sterilized, plants all healthy.

It was considered that these experiments were not conclusive and so some more soil was obtained from the diseased beds in January, 1915. Seed from the same lot as used before was sown in this diseased soil and in College soil. Then a portion of the diseased soil was sterilized as before and when the seedlings were ready six were transplanted from College soil and six from diseased soil to each of the following soils:

(Note.—All seedlings appeared healthy when transplanted.)

1. To College soil.
2. To diseased soil unsterilized.
3. To diseased soil sterilized.

Results:

1. Seedlings from College soil to College soil remained healthy.
2. Seedlings from College soil to diseased soil unsterilized, one out of six developed the disease.
3. Seedlings from College soil to diseased soil sterilized all remained healthy.
4. Seedlings from diseased soil, unsterilized, to College soil, two out of six developed the disease.
5. Seedlings from diseased soil unsterilized, to diseased soil unsterilized, four out of six were diseased.
6. Seedlings from diseased soil unsterilized to diseased soil sterilized two out of six diseased.

Note that only where the plants had been grown, either as seedlings or after transplanting, in the so-called "diseased" soil unsterilized did the disease develop in them. Where both seedlings and plants were grown in such soil four out of six became diseased. Where seedlings and plants were grown in steamed soil, no infection took place, but where seedlings were grown in unsteamed soil and transplanted to steamed soil, one out of six showed the disease.

It would appear from this experiment that the trouble lay in the soil, and that sterilizing the soil with steam prevents the disease. As, however, we cannot find any micro-organism, bacterial or fungoid responsible for this disease, present in the plant tissues, it would appear that the steaming of the soil in this case must be beneficial, not because it destroys micro-organisms but for some reaction which it induces, possibly of a chemical character. What this factor is has not yet been determined.

OTHER TESTS.

Dr. Stone also attempted to establish the disease in healthy plants by bringing diseased fruits directly in contact with them—results negative.

Fumigation tests were also made with hydrocyanic acid in various strengths, as high as 1-3 oz. to 1 oz. potas. cyanide per 1,000 cubic feet, plants both wet and dry, to see if the disease was caused in this way—results, negative.

At this stage of the investigation it was decided in co-operation with the Horticulture Department of the College and others interested to carry on more extensive experiments in the College greenhouse with soil obtained from the house where the disease had been so bad. Plans were drawn up for the experiment to be conducted this fall and winter, but for some reason or other the soil was not forthcoming and so nothing further has been done in this connection.

THE DISEASE IN THE FIELD OR GARDEN.

Dr. Stone and Mr. S. C. Johnson searching for signs of the disease under field conditions in Ontario, found:

4 plants affected out of 400 in one field, and
3 plants affected out of 800 in another field.

Further—

Dr. Stone took some diseased plants which he had grown in his plot experiments and placed them in his garden with other tomatoes which had been started at the same time and place but in different soil.

Results:

At first the new growth that developed was healthy, but later the disease continued to develop in the plants that were originally affected, giving lesions in stem, foliage and fruit, but did not spread to other plants alongside.

This would tend to show that when a seedling gets affected in the bed, the disease will be carried over when the plant is transplanted, but that the disease will not spread from plant to plant. Probably this was responsible for the few infections found in the fields examined by Dr. Stone and Mr. Johnson.

Literature previously published on this disease or one very like it:

WINTER BLIGHT OF TOMATOES.

Bailey's Bulletin (43) N.Y., 1892.

Winter of 1890-91, disease first appeared in greenhouses at Geneva.

Thought to be bacterial, possibly same as bacterial potato blight.

Specimens sent to Burrill, Illinois, who reported probably not same as potato blight.

Then thought might be identical with the southern tomato blight described by Halstead, Bul. 19, Miss. Specimens were sent to him and he reported the diseases were *distinctly different in external appearance and in causal organism.* Bacterium causing southern blight, and micrococcus present in the N.Y. disease.

Prof. Dudley, Ithaca, made reports as follows:

Micrococcus found in limited numbers in cells of both young and old lesions of foliage. (Question if gramles were cocci, D.H.J.)

Lesions looked similar to lesions of bacterial diseases on other plants, blanched at first, later blackened and blighted.

Cultures made from juice of lesions gave no bacterial growth.

Cannot feel sure that this disease was caused primarily by bacteria, which were certainly not present in abundance.

Carried some diseased plants over the summer for further work.

Treatment.—Sprayed with ammoniacal carbonate of copper—negative results.

Boxes in which diseased plants had grown were emptied and the insides washed as follows:

3 boxes with ammoniacal carbonate of copper.
2 boxes with lime wash.
2 boxes with lye.
1 box with bordeaux.

Fresh soil placed in those boxes and healthy young plants set in them.

Placed in house near healthy and diseased plants.

Results:

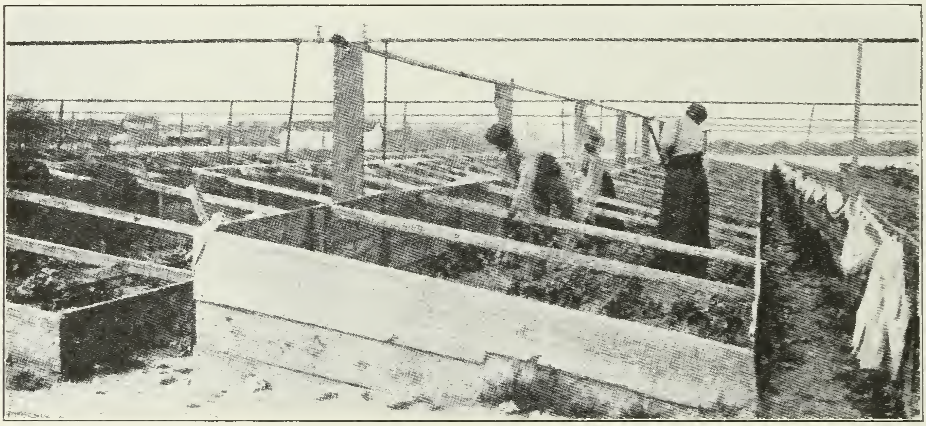
For three or four weeks the plants appeared healthy, but after that time all plants became diseased regardless of treatment.

The same result followed through watering of the soil with ammoniacal carbonate of copper, nitrate of soda and lye.

In one box containing three plants which became diseased, one died and it was replaced with a very vigorous healthy plant. This became diseased in less than three weeks.

Disease spread from plant to plant in separate boxes, their tops not touching.

These experiments led us to the conclusion that the best treatment for this winter blight is to remove all diseased plants at once and if it becomes serious to remove all plants and soil and start anew.



Irrigation system that can be utilized when frames are removed.

We lost entire tomato crop in endeavour to treat the disease.

Bulletin 214, Wooster, Ohio. Page 449—Selby.

(Illustration of diseased fruit on p. 450, showing lesions identical with those we have observed and worked with.) (D.H.J.)

Wilt.—A wilt (*Fusarium sp.*) of tomatoes in addition to that described under bacterial disease has been discovered recently in greenhouses in Ohio as well as other states. It is due to a Fusarium.

The symptoms of the wilt are rather characteristic. It may attack plants either vigorous or of slow development. Commonly the first symptom noticed is the yellowing and drying up of the lower leaves. Soon dark areas appear in the stem and also in the fruits. At all stages cross sections show darkening of vessels. The roots become darkened and watery in the region of the vessels. Eventually the top of the plant wilts and the leaves die both above and below, while the fruit has become worthless. We believe this to be a soil-infesting disease that should be controlled by thorough sterilization.

Correspondence.—Prof. Howitt—Prof. Selby, Dec. 11, 1914. Prof. Howitt wrote Selby asking if he were satisfied that Fusarium, as reported in his bulletin 1910, was cause.

Reply.—Not satisfied that either Fusarium or Bacteria were cause.

CONCLUSIONS.

It would appear from the foregoing experiments and observations that the disease of tomatoes under investigation here called "Tomato Blight," is not of a parasitic nature, either insect, fungous or bacterial. It resembeles in many respects the Brown Rot of Salonaceæ particularly in the browning of the vascular bundles. So far as we can determine up to the present it appears as a physiological trouble in the plant tissue induced by some factor in the soil, possibly an injurious chemical reaction, which enters the plant system through the roots. It occurs in tomato plants grown under cover and is liable to cause heavy losses. It has been found only to a very limited extent in the field.

Steaming the diseased soil has, in a limited number of experiments, proved beneficial. Whether treatment of the soil with chemicals will prove equally effective we cannot say from our own experience, as we have not tried it.

F. F. REEVES: With regard to propagation of seed: does disease propagate from seed or not?

D. H. JONES: We are not sure on that particular. We have tested growing plants from seed to produce the plants which in the original case reported became diseased, but when such seed was sown in our own soil we did not get any disease from that seed. But the experiments with so-called affected seed have not been very extensive and we should not like to say for certain whether it is carried over by the seed or not at present.

F. F. REEVES: I have tried to save some of the seed from every plant, in particular where every fruit was affected—and from this seed, on the plant grown every fruit was affected.

D. H. JONES: We will be delighted to have some of the seed.

THE SKINNER SYSTEM NECESSARY FOR SUCCESSFUL MARKET GARDENING.

THOMAS DELWORTH, WESTON.

I certainly believe that statement is correct. Some of the other speakers today have intimated as to what success in market gardening means. Our good friend, Mr. Scott, here, indicated something along that line in his address, as to extensive, pretensive, and intensive farming. We have visited gardens where we have found some very well-grown specimens of vegetables, but when we come to figure up the work and look over the methods, we decide that while that man was producing very good vegetables they were being produced at a very small minimum of profit. Other places we have visited again where large operations were being conducted, large fields devoted to various crops, and, in looking over the work and the results, we have thought that business, too, was conducted with a minimum of profit to the proprietor.

The most successful market gardener is the man whose business is conducted to give the largest percentage of profit in his business. Now perhaps someone will say, that is a small view to take of your business—to figure it out in dollars and cents. To that I would reply, in the first place, to get the maximum of profit, we have got to give the people what they want—a little better than they have been getting, and we have got to cut down the cost of production, so that we will be able to give them what they want at a price that will allow us a larger percentage of profit than the ordinary man is getting. That is how we are getting the best results out of our business.

I have all sorts of sympathy with co-operation; in order to get a better price you must have the sympathy and help of others in the business. There is something in this line that we have got to work out by ourselves that will very materially assist us in making the best returns from our business.

In regard to the Skinner Irrigation System: I do not know that there is any need for me to advocate the Skinner as against other similar systems of irrigation. There are a number of them that are all doing good work. I have seen several of them in operation for myself after adopting the Skinner, and the Skinner seems to me to meet my needs better than the others I have seen.

In order to get the best returns, first of all we should consider the question of cost. I have had a number of people say to me, to what expense would a man be justified in going in order to instal that in his place? How much per acre do you think he could put on it and then make a profit on capital account and make it pay? That is a question in which a great many other questions are involved. You have to get, in the first place, the man's market, the man's product, and then the man himself. There are some men who have gone to work and bought animals for stock-raising purposes, paying $1,000 per animal, and they have made money; other men, again, could not begin to make money at it. I have seen one of my neighbors who paid $1,000 for a team of Percherons. Before he had them two years he would have taken $400 for them. Other men, as you know, have gone into that and paid more money, and waxed rich on the job. But, taking a man of good business ability who will make good use of his opportunities, I may say that an installation of the Skinner system good enough for all commercial purposes may be recommended at about $100 an acre, that is, of course, figuring that you have the water supply on your place. That is over and above your pumping plant and delivery. Then you have to give the distributing mains and the overhead work, nozzle mains, etc. But a system good enough for all commercial purposes may be installed for $100 an acre. I am figuring work as well in this.

This work is rather a tedious job. In some places we have men who take contracts to do the work of drilling and putting pipes together. If you put a greenhorn at it, he will break parts and it becomes expensive and is tedious at that, and if you have a man in the neighborhood who is taking contracts to do this work, I would advise you to have him do it. We have a firm here in Toronto that do it at a reasonable price, and it will pay you to give them the work. I figured out the cost that this firm charged a neighbor of mine to do the work, and then I figured my own, and I made $10 a day for the work last summer, so that with a little practice a man can get into the way to do the job himself. But if you have a lot to do, the job is apt to hang on your hands.

A great many find it impossible to supply themselves with irrigation. There is no use putting up overhead mains, nozzle mains, etc., unless you have an abundant supply of water. As to what expense it would pay any man to go to, we come back again to the old proposition, so much again depends on the crops he intends to grow, his market and himself. There are a great many crops it would not pay you to have Skinner irrigation for unless you have a fancy market. Wherever you have that, it certainly is a factor in getting that fancy article. Now the Skinner irrigation, or any irrigation scheme, will supply moisture for the growing of the crop. You can't grow crops on water, but you must give a plant water in order to give it a chance to grow. Water simply acts as a medium to make the plant food available to the plant, as that food becomes soluble in water, and the plant will not use the food unless it has water and an abundant supply of soil. Now, the Skinner irrigation properly installed will give you that, so that you will never have your plant growth checked by lack of moisture.

This presents a number of very interesting and very intricate points. One of these is companion cropping. Now the most intensive companion cropping I saw was on a large scale a year ago in Philadelphia, on the Seabrooke farm. Three or four crops growing on the same farm. I may say for myself that I have never succeeded in making any kind of a success of that sort of thing. I have tried it on various occasions, but I have never made a success of it. I find that I get better results by taking one crop off and putting the other in. But that is made possible by irrigation.

Potato digging in New Ontario.

Mr. Davis spoke of getting a crop after his crop of beets and potatoes. The trouble I have always found is that when you take a crop off the latter part of June or the early part of July there is not enough moisture there to start the second crop. We generally have rains about the latter part of July or the early part of August. Irrigation often makes a second crop possible where otherwise it would not be. After the first of August this year we had more rain than we knew what to do with. In June we used our irrigation, and during July until about the 22nd of the month. Now we took off a crop of potatoes on the 11th of June—I may say that our potatoes suffered the same as all of yours by being frozen on the 27th of May and they had to make another start, which made them about ten days or two weeks later than they would otherwise have been. We planted some of our celery about that time, the crop was very dry until we applied the irrigation. Unfortunately, owing to the wet weather, it was not covered with spray as much as it might have been, we had a little blight, but we had a fair crop of celery. Some of that celery was planted on the 21st of July, and we finished up on the 29th and 30th of July. Some of those peas that I was telling Mr. Logsdail about this morning and some others we took off about the same time, and we put in another crop of celery after that. Well, you may say, we had lots of rain, and it was easy enough to have a second crop in a year like this. After about the first week of August we did not use our irrigation at all, in fact, a big umbrella was more suitable, but it simply makes these combinations possible, and they are impossible without the irrigation.

You have a problem there as to whether it is wise, as to whether it is good business to try this out, perhaps to the disadvantage of your principal money crop. I have always found in my experience in market gardening that it does not pay, for the sake of taking a chance on a small after crop, to spoil your chances on a crop of cauliflower or celery. Bank everything on your main money crop, whatever you do; but do not let the small crop interfere with your money-maker. Another crop we tried this year was a crop of early cauliflower. We had a crop of that with a crop of celery. I do not want to go into that except to say that I advise every member of the Association to look up in Mr. Johnston's report the treating of cauliflower and cabbage maggot. I found that my crop of cauliflower maturing the early part of July will stand an awful lot of water, and we can give it by the Skinner irrigation and keep it growing right along. One peculiar thing was with that cabbage maggot, that on the part of the ground that was covered by irrigation and treated we carried them through and made some sort of a crop, but where they were not covered by irrigation the plants that were not treated died out completely. We could carry them along as long as we could supply them with moisture, but when that failed they died. I am telling you this, that where plants are not allowed to wilt and suffer from lack of moisture at any part of their growth they have a chance of fighting other disadvantages with which they may have to contend.

I do not know that I can give any more definite figures in reply to the first question as to what expense it would pay a man to go to instal irrigation. The cost of getting my water supply was a great deal more than my cost of distributing. I now have about seven acres under irrigation—I have only eleven and a half acres in my place—and I hope next year about this time to have most of it covered. At $100 an acre, you see that would be about $1,150, and my plant outside of that cost just about double that—my supply outside of the distribution. We are thoroughly satisfied with it. We think it is a good investment, and we are proving it. Whether it would pay you to go into that or not depends on your market, the kind of crop you grow, and on your business ability.

Take the Toronto market—we grow for Toronto market exclusively. If we can get something on the market here when others have not got it, you all know what that means. I can get the price for it. If we all get it together we have to compete against each other. We do it in a friendly way, but we have to do it, and, when we get out of that competition, then you can begin to charge your own price for the goods. You will say, "But suppose we all come to this, what will the result be?" In the first place, all the vegetable growers in the Province are not going to do it. A very, very large number of them would have a great deal of trouble in getting their water supply. I have talked with a number of them who are going into this thing, they will say: "I have got a splendid well in my backyard which has never gone dry yet," Did you ever put a steam pump on it for 24 hours? One of my neighbors put a windmill on his place, it ran for two hours and then went dry. The Skinner irrigation uses approximately 40 gallons of water per minute. They use about 200 nozzles per acre. Those two hundred nozzles will discharge approximately 40 gallons of water per minute. On any source of supply that will not allow you to take 40 to 50 gallons a minute and keep it up continuously for 4½ hours, I would not want to spend a great deal of money because you would be so restricted in the work you were doing and the amount that you could do, that it would be hard to make it a profitable proposition. But my own supply of water is inexhaustible. I have to lift my water 120 feet. My source of supply is 120 feet below my garden, that is an ordinary pressure of 156 pounds owing to the height that I have to overcome, that is when I am working 40 pounds per gallon. I like the electric engine. I have used gasoline, but where I can get electric power I do not want gasoline. Gasoline possibly is just as cheap, but it is not nearly so reliable. The best gasoline engine that ever came along will try your temper once in a while.

That is all I can tell you with regard to that. If there are questions you would like to ask, I will be pleased to answer them to the best of my ability. I certainly think that where your market lies close to a large city like Toronto that additional expense is warranted, providing, of course, you can get your supply of water.

As regards the kind of soil for an irrigation system: I have seen it in operation on a great many different kinds of soil. I had an old market gardener once in the Province come to me and say, "My soil is not suited to this at all, it will get so hard." I had already spent a little money, and I had made up my mind to go ahead with it. I have seen this used on a great many kinds of soil, and I do not just know what kinds of soil it will not do for. I believe it can be used on all kinds of soil. We all know that a heavy clay soil is not suitable for market gardening, and yet we all possibly know of someone who has made money on heavy clay soil. It is not an ideal condition, it means you have to give it more care. Sandy loam you can go and plow, with a clay soil that is not always possible. But to decide that the thing cannot be made a successful proposition on account of the soil is a mistake.

W. McMeans: How far apart do you space the nozzles?

Thos. Delworth: I have tried to have mains placed at different lengths. I have tried them at 4 feet and at 3 feet 6 inches space, unless you get heavy pressure. To test out what different pressure would give me, I like to get to work at from 40 to 45 pounds, and put the nozzle lines close together, then you could do all right with 4 feet apart. We usually work with about 35 pounds, and I have put them 3 feet 6 inches. Now with our supply I have used as many as 24 feet of nozzle line at the present time running 600 feet. We have a pressure gauge at our distributing point, and another down at the pump, and we can take the pressure about 3 feet 6 inches. I find we get the best results with 4 feet.

W. McMeans: With 600 feet long, what size pipes do you use?

Thos. Delworth: We start out with 1¼ inch pipe to 300 feet, then we go down to the 1 inch and finish up with ¾ inch, which will carry a steady pressure. If we let our pressure go down to say 20 pounds, the throw in the centre will be farther than the throw at the far end. In installing, make plenty of provision for flushing out your pipes. You know they are likely to get dirty in the winter time and apt to clog. The question of keeping that out is a very, very serious one. I have tried wire mesh and all sorts. You get this fine copper gauze and put it over, and start it going, and you will get the result, that, while the gauze will be filled over with vegetable growth, to look at it down the water it is perfectly clear, but the water will not come through it, and the only way to clear it is to take it off. Then I tried coarser mesh, common cheap door screen. That did fairly well, but it allowed little, small stuff to come through. Now this trouble has not been very serious with us. For flushing out, the best thing I have seen so far, instead of putting on a cap put on a valve with a level opening. That is what they use in the Seabrooke farm. If you get a ¾ inch valve, that costs you, I think, somewhere around $13 a dozen, with a level opening, you push that level down and the opening is the full size of the pipe, and it flushes up and brings everything with it. Shut off the water and turn off the cap, and it comes along steadily, but there is no pressure. You open it and you get that pressure, then fish up the valve. Then at the supply end we put another one, and you can shut them off.

C. W. WAID: Have you tried irrigation to control frost?

THOS. DELWORTH: No, I did try this spring, with a batch of potatoes under irrigation. They got frozen. I was sure at night they were going to freeze. The boy and I talked over what we could do, and decided that it would be a tedious job running that irrigation all night, some one of us would have to stay up all night, as if you want to use it as a protective against frost you have to keep the water moving continuously. So I said, "One of us will get up early in the morning, and if there is a frost we will see what effect it has on the plants before the sun goes up." I got up the next morning. There was a frost, about ¼ inch ice. The potato plant leaves were so that you could break them in two. We started the pump, but there was no advantage at all on those operated on over those that were not.

SOME GREENHOUSE PROBLEMS.

C. W. WAID, LANSING, MICH.

The man who is engaged in the Vegetable Forcing Business has his problems to meet, no matter whether he has just started in this line of work or has been engaged in it for years. Some problems are like a bad penny, liable to return at any time, while others are like a silver dollar, soon gotten rid of. Still others are like counterfeit money and must be watched for all of the time.

The person who is just starting in the forcing business has many things to learn. Even though he may have had much experience in outside gardening, he will find the inside work quite different. Vegetable-forcing is the most intensive kind of gardening, and because of the heavy investment each foot of space must be made to give a maximum return, if the undertaking is to be a profitable one. It may seem to the beginner that it should be easier to grow crops under glass, where the grower can control the heat and water supply, than outside, where the weather man gets in his work, but he soon learns differently. Of course it frequently happens that on new soil and where things run smoothly at first the inexperienced man has wonderful results the first year and especially with the first crop. The writer saw an excellent crop of tomatoes in a large greenhouse, 72 x 540 feet, the past season which was grown by a man who had never grown tomatoes inside before and had never seen any grown. He was, however, a successful florist, and the house and soil were new.

As a rule, after the first season, and frequently during that time trouble begins. One of the most common mistakes of the beginner is neglect of details. If he has been an outside gardener, he is liable to underestimate the value of small things. The man who has not had experience of any kind in garden work is even worse off, as he not only fails to realize the importance of little things, but often makes big mistakes.

After crops have been grown for a few years in the greenhouse, soil problems frequently arise, and diseases are usually more liable to give trouble. There is often need of a greater diversity of crops to meet the market demands after a person has been in the business for several years than at first, and this means a study of the requirements of new crops.

In order to be more specific, we will consider some of the more common greenhouse problems.

The prospective greenhouse man is confronted with the question: "Will it pay me to go into this line of work?" In reply, I would say that depends upon the demand and supply at his available markets and his ability to apply himself and his likes and dislikes. There is no doubt but that in some parts of the United States the supply of greenhouse lettuce is greater than the demand, with resulting low prices. Not knowing the conditions around Toronto or other parts of Canada, I cannot say whether you can profitably erect more greenhouses or not at the present time. You can decide that part of the problem better than I. Human nature, however, is pretty much alike the world over, and I would caution the man who cannot apply himself closely and see and do the little things against attempting greenhouse work. The man who does not like such work should not attempt to force himself to do it because he thinks there is money in it. The man who has to push on his own lines will seldom keep his traces tight. I know a greenhouse man who has one son. The father is very anxious that the son should take an interest in his greenhouse work which is extensive and would give the son a good income. The son, however, does not like greenhouse work, and while he has tried to carry on the work two or three times he has never stuck to it, and I think would never make it a success. The prospective greenhouse man should keep in mind that this kind of work is very confining. It means careful attention day and night, Sundays and holidays, as well as ordinary week days.

When a person makes up his mind that he wishes to start in the vegetable forcing business he should consider several things before locating his houses. The closer he can get to a good market the better. Avoid having to ship if possible. Locate the houses near a shipping point if coal is to be used as fuel. It is expensive to move large quantities of coal even a few miles, especially over poor roads. The soil over which the houses are to be built should be well drained. A heavy clay is least desirable. A sandy loam is to be preferred, although a clay loam is quite satisfactory. Be sure of an abundant and pure water supply. If possible, locate the houses where they will be protected from the prevailing winds.

The Seed.

Whether the greenhouse man is a beginner or an experienced grower, the seed question is always an important one. Cheap seed is usually the most expensive in the end. Pure lettuce seed is hard to get year after year. If a person does not care to grow his own lettuce seed, which is not so very difficult, he should test out a sample from two or more sources before deciding which particular seed he will use for his crop. Several cucumber-growers have developed special strains by selecting from individual plants in the greenhouse. This same method will prove satisfactory for tomatoes. The successful grower is very careful about the purity and germinating power of the seed, and he spares no reasonable expense in getting the best available.

The Soil.

The condition of the greenhouse soil spells success or failure for the grower. It must be open and porous; by this we mean full of humus or organic matter. It must contain an abundance of available plant food, but should not contain an excess of one element and an under supply of another. In other words, the plant food in the soil should be supplied in the proper proportions for the crops to be grown. The chief source of plant food and organic matter is of course stable manure. The greenhouse man usually supplies manure more liberally than the outside grower. In a few cases that have come under my observation there was too much manure used for the good of the immediate crops. This is the exception, however, and not the rule. A more common mistake is to think that stable manure has all of the plant food in it which the plants need. As a rule, stable manure is deficient in phosphoric acid. To supply this deficiency some growers are adding acid phosphate to the manure at the rate of about 40 pounds per ton of manure. This should be done as soon as possible. If the manure is taken from cars and piled, the fertilizer can be applied when unloading. The manure which is made on the place should be treated with acid phosphate in the stable. One of the most satisfactory methods of handling the soil which the writer has used is to apply what we call the summer mulch. From four to six inches of manure are applied on the surface of the greenhouse soil as soon as the cucumber or tomato crops are taken out in August. This manure is left on the surface for from four to six weeks, during which time it is soaked with water once or twice a week. This watering is very important, as it keeps the soil in good mechanical condition and carries down into it much readily available plant food. Just before the lettuce crop or any other is to be planted, the coarser part of the manure, if there is any too coarse to work into the soil, is removed and the remainder spaded into or under the soil. If this plan is carefully followed there will seldom be need of more manure or fertilizer being added until the tomato or cucumber crops are maturing fruit the following spring or summer. Greenhouse soil is usually so well supplied with nitrogen and potash through the manure that these chemicals applied in the form of fertilizers seldom show marked results. It is, however, a good plan to save and apply to the soil all ashes from burned tobacco stems. In some cases, when the soil needs are known, chemical fertilizer can be profitably applied in small amounts.

Growing the Young Plants.

One of the most important things to keep in mind in connection with the growing of all greenhouse crops is to have good healthy, well-rooted plants of the proper sizes when planted into the permanent beds. Many lettuce-growers make the mistake of letting the plants become spindly. They never overcome this tendency entirely. Too close planting in the seed bed or not transplanting them soon enough are two reasons for spindly plants. Too high temperature in the plant house is another. The seedling plants should be set at least 2 inches apart each way in the seedbed. It is an advantage to have the plant house so arranged that different temperatures can be kept according to the needs of the plants growing in them. To start cucumbers successfully in cold, cloudy weather the temperature of the plant house should be seventy at night and during cloudy days, and it may run much above that during bright days with no ill effects. The important thing to keep in mind when growing cucumber plants is that they should never receive a check in growth. This applies also to tomatoes, but cucumbers are even more liable to be damaged by adverse conditions than tomatoes. The temperature for tomato plants need not necessarily run quite so high as for cucumber plants, but it is best to have it 65 or above if possible. Tomato plants which are checked in growth either by low temperature, lack of water or in any other way, are more liable to fail to set an abundance of fruit than plants that have received no such check.

The small grower who desires to make the most of all of his ground in the greenhouse can use two-inch clay pots in which to grow his lettuce plants to good advantage. The lettuce should be started in the regular way, then transplanted once into flats or benches and before it begins to crowd into the pots. The pot should next be plunged into the soil in the benches or beds in which lettuce plants which have just been set are growing. The potted plants may be left in this location until they begin to crowd then transplanted into the soil in other beds.

Sutton's Excelsior Peas on July 1st.

Ventilation and Watering.

Much trouble is caused by lack of sufficient ventilation in the greenhouse. The resulting moisture-laden air and high temperature when the vents are down tight on bright days furnishes ideal conditions for the development of certain organisms which cause some of the diseases known to greenhouse men. I contend that for most plants it is better to give plenty of air and get them accustomed to it than to baby them too much. It usually happens when the houses are kept closed most of the time that sooner or later someone will leave the vents wide open on a windy day and the tender plants become covered with mildew or some other fungous trouble. My advice is to keep the ventilators open at least a "crack" every day except snowy days or when the temperature is very low outside.

The modern method of overhead watering has simplified that operation considerably. At first many growers thought it would not do to use the overhead spray for all crops in the greenhouse and at all times. Most of the growers who have used this method for some time find that by watering on bright days and preferably early in the day, they have no bad results from overhead watering. Of course judgment is needed at all times. If some diseases get started such as lettuce drop, it could no doubt be enhanced by injudicious watering. It is not advisable either to water lettuce when it is nearly mature, as it is liable to lodge and thus much of it is brought in contact with the wet soil. Both as to economy and efficiency the overhead system of watering is far superior to the old fashioned hose.

DISEASES.

The disease problem alone is sufficiently large that we could spend considerable time on it profitably. Some of the operations which have been discussed have a direct bearing, however, upon disease control. It has been my contention for some time that if a plant is given as nearly as possible ideal conditions for its growth, trouble from disease will be greatly reduced thereby. I fully appreciate the fact that certain diseases such as nematodes will attack and destroy or greatly weaken the most healthy plants. When such diseases get a foothold drastic action alone will overcome the trouble. Such diseases, however, as lettuce drop, rhizoctonia, mildew, etc., will seldom give serious trouble on perfectly healthy plants, when such plants are given proper attention.

Here is where the " attention to details " comes in very strong. When a person visits a greenhouse where the owner is always on the job and has his eyes open for every little operation that goes on in the plant, the visitor will usually find little serious trouble from diseases. On the other hand, when a person visits a greenhouse where the owner divides his time between the greenhouse and some other business so that he is away from the greenhouse a good deal, he can expect to find diseases playing havoc with the crops. Of course there are exceptions, as there are to all general rules, but, in most cases, the health of the plants depends on how they have been handled, not from the cradle to the grave, but from the seed time to the harvest.

J. J. DAVIS: What do you do if you have a lot of lettuce you cannot sell, and you have to hold them for another two or three weeks after they should have been on the market?

C. W. WAID: I usually advise having a good supply on hand, so that if you find it necessary to throw away any you will have some left. Here is another thing that you can do, that is to cut them back at certain stages without seriously injuring them. I do not recommend that as a very good plan to follow as a general rule, but under conditions you speak of it is better than losing them.

J. J. DAVIS: We often find we are obliged to clip them.

C. W. WAID: The larger growers arrange to have a regular space that they cut every week for a continuous supply, and they have those plants coming on in such a way that they are about the right size when they remove them, even though they may not be as large as they would like to have them, so that in that way they do not get the overgrowth.

J. J. DAVIS: What is the nature of the disease Rhizoctonia?

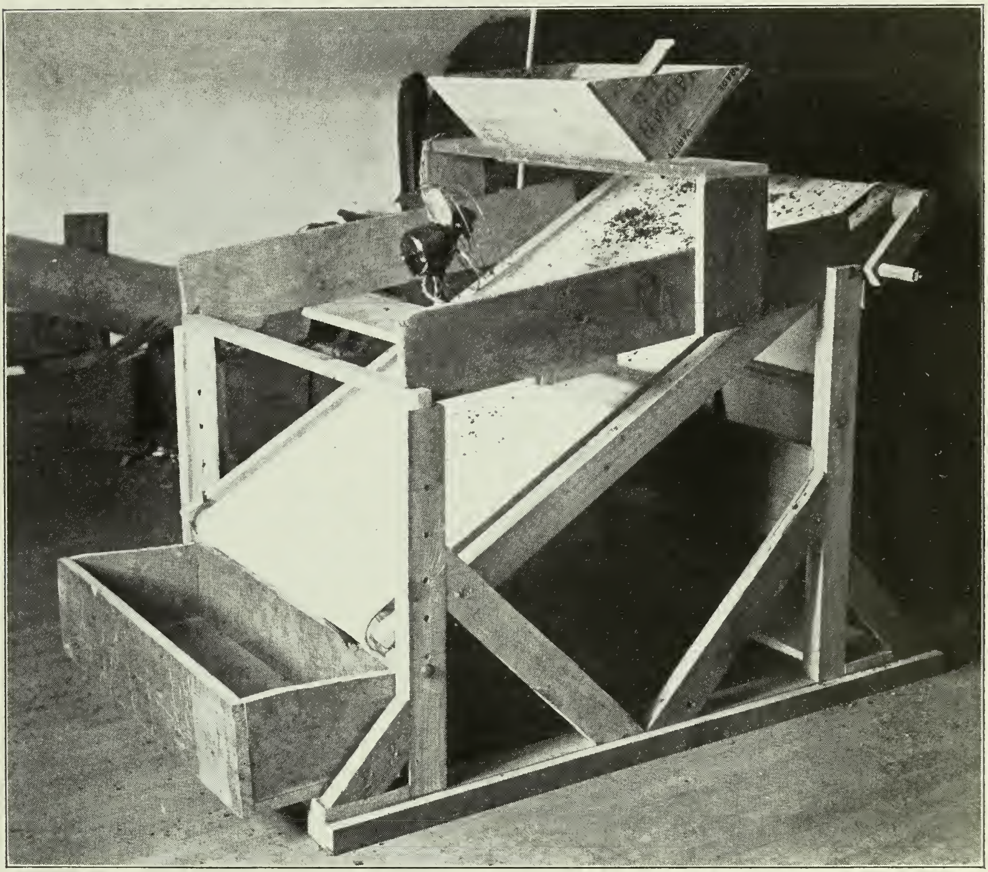
C. W. WAID: There is a bunchy root growth and dark colored roots; in some cases the plants will never get more than two or three inches in height. I have seen entire houses in that condition.

J. J. DAVIS: Last year in a house that I sterilized I had a lot of that in the first crop after sterilizing. Afterwards I had no trouble at all. This year again in the house that I sterilized I had the same trouble, while in the house I sterilized last year there is no trace of it. I have been wondering if steam in sterilizing kills the bacteria in the soil or what it was attributable to?

C. W. Waid: There have been some unsatisfactory conditions on certain soils from steam sterilization. What is the nature of your soil?

J. J. Davis: Sandy loam.

C. W. Waid: I should hardly think in your case that steam sterilization would be responsible for your trouble, and I would need to be there and study conditions before pronouncing judgment. You are sure that an abundant supply of water was given at all times?



Home-made seed-cleaning machine. The heavy, clean seed rolls down the belt into the box at the bottom; the rough surface of the belt and the electric fan carry the chaff and dirt upward, and, when turning over the upper roller, it is removed by a brush.

J. J. Davis: Yes.

C. W. Waid: I have frequently seen where plants showed this disease where sterilizing was done and not sufficient moisture given the plants. In your case, where you sterilized and watered also, it would be hard to explain without a more careful study to get the details more thoroughly.

J. J. Davis: It seems to me more in the first crop after sterilizing. The next crop is all right. In the houses that were sterilized last year, I do not think lettuce could do better than it did in them.

C. W. Waid: In what kind of soil did you start your plants?

J. J. Davis: Sterilized soil.

Thos. Delworth: Can overhead irrigation be used on tomatoes without injuring the blossoms?

C. W. Waid: It can be used successfully if applied early in the morning and not too frequently.

J. J. Davis: What do you mean by "lettuce drop"?

C. W. Waid: It is a disease which causes the plant to rot off near the surface and fall right off.

J. J. Davis: After it gets large?

C. W. Waid: Usually, it is in the latter stages of the growth, and very largely a matter of giving plenty of air and using judicious watering. If you water later in the day and have too high a temperature you are very apt to bring about that condition.

F. F. Reeves: How is it that you frequently see that directly under the ventilator?

C. W. Waid: Of course that would be rather hard to explain in the cases you refer to, but it might be the draft coming on it very suddenly. The temperature being held up during a portion of the day and then the ventilators being thrown open and the draft striking the plants would cause the condition.

J. J. Davis: Is not that considered to be a bacterial disease?

C. W. Waid: No.

J. J. Davis: It has a milky, sticky appearance. We get lettuce perhaps that looks all right one day, the next day it is entirely down.

C. W. Waid: Where do you find the sticky condition—around the stem?

J. J. Davis: Yes, and wherever that plant touches another plant the leaves decay.

C. W. Waid: It may be that you have another disease there that I am not familiar with, but the lettuce drop shows usually a mildew appearance soon after it develops right near the surface.

J. J. Davis: That is a different thing. I have been trying to find out whether this was the same or not.

C. W. Waid: Yes, it is a mildew; you will often find the same thing on tomato plants, and it will show in this way: that the stem of the plant will have pronounced black-colored disease germs showing a good deal like a heavy application of mildew, and if that is left on for some length of time it will cause the stem to rot off entirely, while if you take it in the early stages of its growth and wipe it off entirely it will usually not develop.

J. W. Rush: Lettuce drop does not appear until the lettuce is pretty well developed?

C. W. Waid: No, it does not appear in the early stages of the growth. In very bad cases of lettuce drop the cheapest way to get rid of it is to sterilize the soil.

PROBLEMS IN MARKETING.

Howard W. Selby, Philadelphia, Pa.

I had read an article written on the Departmental Stores of Toronto and their co-operation with the market gardeners of this section, and that you were marketing your produce through this medium. And I imagined that I was coming to Utopia and could get ideas whereby we might obtain the same accomplishments and results. So that when I came I diligently looked your newspapers over, thinking I would surely find some write-up of the departmental stores and their food products department in Tuesday morning's issue. However, I did not find anything. Then I visited the St. Lawrence market, expecting to find some farmers' stalls there, and instead of that I found a number of merchants, all of whom told me they buy their products direct from the truckers in this neighbourhood, and that they themselves are not engaged in the business of producing. I judge that you have not yet succeeded in finding a one hundred per cent. perfect method of distribution.

Now, a word of introduction relative to my connection in Philadelphia County. As Secretary of the Vegetable Growers' Association, I come in pretty close contact with vegetable gardening. About 1829 the pioneer of the market gardening industry started up in Bustleton section, which is about fourteen miles from the centre of the city of Philadelphia and at the same time within the city limits. At first they carried on the business of general farming, then they went into that of making butter and raising vegetables, only on a small scale, and at last a good farmers' market developed there, and the farmers were getting good prices out of the products sold, and gradually took steps to enlarge the gardening space. Now there are farms of from 10 to 225 acres devoted entirely to the production of vegetables and small fruits.

Here is our problem—land valued at from $600 to $1,500 an acre—all heavy clay loam, and as Mr. Delworth said in his talk this afternoon, that is without doubt one of the hardest soils to work for market gardening. They say you cannot use irrigation on it. Let me say that one of the difficulties with irrigation has been that the farmer thought all he had to do was to irrigate, paying no attention to the feeding of the soil or to cultivation, and he would have satisfactory results, with the outcome, of course that they had a few failures.

In the course of this growth in the business, there was a wide field for the study of market conditions. With the beginning of the business the market handling did not require much ingenuity. As the gardens increased, however, every grower had a man standing continually in the farmers' markets. A little later on some growers found that they were producing too much to handle in the markets, and that resulted in selling to the grocer and to the consumer at his own door. Later it was learned that it took some half dozen wagons to handle any quantity of produce, and that real experienced salesmen were required as wagon drivers. The outcome was that they found it was costing twenty to thirty per cent. to do business in that way, and the consequence was that a few years ago our company opened a wholesale produce house in Philadelphia. Some of our neighbours later approached us and asked us if we would not handle some of their produce on a commission basis. As a result, our business grew into a general receiving line, and we now represent the farmers from New Jersey and Southeastern Pennsylvania, and scattered sections of the Eastern United States.

In the local markets where we used to sell there are a number of the market gardeners of our Philadelphia Association still operating, and we know that they are doing business at a tremendous expense. The man who raises the crops always has that desire to go to the market and see that they are properly placed, and they will stand there two, or possibly, three days a week, sometimes, at the height of the season four days a week. And what is the result? The labour at home becomes inefficient and careless, and his division of time results in neither that man's garden nor his market interests being looked after with the proper attention. My contention is that a man in order to be an expert in either of those lines must stick to one or the other. If he is going to be an expert market man, it is going to take six days a week to do it. If he is going to be an expert market gardener, he has to stick to it six days a week. Therefore the produce was turned to our commission house, and we found that instead of costing us about thirty per cent. or more to stand in the market selling our product it was now costing us a commission rate of ten per cent. to sell the goods.

I was surprised to learn in going to your St. Lawrence market that there were no market gardeners there. And I was informed that Saturday was the only market day you have in Toronto. I was also told that you stay at home during the five days in the week and come in to the market on the sixth; that during the five days you sell to the hucksters who sell your product to the consumer in the city. Suppose we were to try that thing at home. What would be the consequence? Simply this, we have a line of goods which we are trying to standardize, trying to put up in an attractive manner, and we want the people to buy those goods from us every day in the week. If we come in only one day a week, we can't supply the product fresh every day. If we stay out five days and come in on the sixth, we are going to have only transient trade.

In our section we have a question before us in the matter of transportation. I understand that most of your market gardens are within a radius of five miles of this city, some of them extending eight miles. Some of you seemed to be interested in a discussion to-day regarding the use of motor trucks. We have found that that is the only solution to our problem. Formerly we brought our product from our farms, fourteen miles, requiring three teams—six horses. That meant three drivers to do the work, which we are now doing with one motor truck of three tons, and we are finding that a saving. That means that the market gardening section is reaching out more than fourteen miles from Philadelphia, and as far out as twenty to twenty-five miles, you can find gardens where the man can get in with his product quickly. Now, then, how much cheaper land can you get by going out twenty miles from Toronto? And I understand your roads are in excellent condition. You can overcome a great deal of your problem there by using the motor truck and developing truck gardens on cheaper lands. The motor truck which we run carries 120 barrels at a time, but such a truck is not to be recommended to the average trucker. A lot of our men are using a one-ton capacity truck, and these pay for themselves in a short time. In this way we save wearing out of horses, getting through at earlier hours, and altogether make the position of the market gardener much more delightful and business-like.

Then there is the question of standardizing of packages; and the package question has received a great deal of attention. In Bustleton section the farmers have for years been accustomed to packing their celery in barrels, forty to fifty bunches in each, according to the size of the celery. In this way, when a man comes in to market the first thing the prospective buyer does is to dig down into that barrel and draw up five or six bunches to look at it. He may buy it or he may not, and you know what the result of such handling is to the appearance of that celery. We have adopted in that neighbourhood a gift package which holds twelve or fifteen bunches. Our bunches are tied three or four stalks in a bunch and tied flat. This we cover with waxed paper, and when a box of that celery is opened, the waxed paper is turned back and the man who wants to buy it can see exactly what we offer. These packages cost us exactly ten cents to put up. And what is the result of that simple little bit of ingenuity of wrapping that celery up in waxed paper and offering it for sale in the neat package. The celery brings us in from two to three cents a bunch extra, or thirty cents more for the box, which means a gain of twenty cents on a dozen bunches.

There is something more in it than the extra price which we get out, and that is in creating the demand. I will give you an instance here that I came in contact with last season. It was not with vegetables, but with apples—but what applies to fruit applies in the same way to vegetables. We have a shipper of apples in Virginia, a woman who manages large orchards there. She uses for a trade mark the orchard name. She packs those apples in her own way in barrels, labelling them with the trade mark. Last year when apples were so cheap and 175 cars were standing in the yard at Philadelphia, her car of apples came in, and was sold out at from $3.50 to $3.75 a barrel. Why was this? The prevailing market price on this particular variety of fruit was $2.75 to $3.00 a barrel. Simply because the purchasers knew her brand of goods; they knew that every apple was going to count. There was character in that package. That same thing holds good with our celery. We put our name on labels on every box of it, "Grown, Packed and Guaranteed" with the name of the farms from which the celery is secured. What is the result? People are calling up from various sections, and ask us to "save me so many packages of that celery." They are satisfied to buy from Long Distance, because they know that the goods that bear that name can be depended upon. So much for what people think of this standardized package. Why is it not applicable in our business? Take the "Uneeda" biscuit. Instead of buying "Soda Biscuits" the way we used to do, we now go into a store, lay down our nickel and we get the neatly wrapped package with waxed paper, and we are paying at the rate of fifteen to twenty cents a pound for that biscuit. That five cent package is all that the average household needs. That thought is applicable to the wrapping of apples or anything else. My thought is to bring the package down to the absolute need of the housekeeper. In Pennsylvania we have some wonderful land for the raising of apples. After three years of work we find that those people have something which is worth while presenting to the public, something which they are pleased to put their name on. The thought is to get away from the barrel of apples, and we are using the bushel box, with the result that we are packing the apples in the orchards of this section in the bushel boxes. We advertise them to the housewife of Philadelphia, by telling her that we have a box of apples that she can place in her home which will keep until they are used, and they can depend upon every apple being guaranteed and in good condition. Every one of those boxes is labelled, has the name of the orchard and the name of the grower on the box. Last year I started on the fruit of one particular orchard in the southern part of Pennsylvania, and put out a letter telling the people of our section that they had been using apples which came from the North-West, beautiful in colour and glow, but when they began to eat them, they were a sad disappointment—that we had apples which were grown a few miles from their residence, and that we guaranteed them to have the colour, with quality backing them. We talked them, "Health's best way eat apples every day," and "An apple a day keeps the doctor away." Using those slogans, we put that apple on the market. I sent letters to some ninety banks in Philadelphia and suggested to them that they have a box of apples under their desk and when their friends came in, instead of treating them to a cigar, give them one of those apples. We had every box labelled with our firm name. At the end of the week I traced eight sales to one bank. They were giving satisfaction. As I said before, apples were cheap last year. Stayner Winesaps were selling at $3 a barrel, sometimes as low as $2.75 a barrel. But when packed in a box we got $2.25 a box for them. It takes three boxes to make up a barrel, which gave us $6.75 for a barrel of those apples. Of course, you have in this way to absolutely guarantee the fruit in the boxes, and every apple must be depended upon to be first class, and it is true that some fruit would have gone into barrels which would not have gone into the boxes. But how much better, was it not, to get $6.75 a barrel for the absolutely first class fruit, and sell the balance as culls, which they actually were.

We have much difficulty in the growing business thinking too much of time we have spent, how much care we have given in selecting the seed, and how much thought and time we give it in every respect, and we think that because that product was grown on our farm it must be ideal. We must get away from that thought. We must think of the person who is ultimately going to consume that product. What is he going to think about it? The public want quality, and they want the appearance, and we should give them what they want—so long as they pay for it. I have been working on the farms in Southern Lancaster County in Pennsylvania, and it has been an interesting procedure. Prior to the time of my going out there they had been sorting their potatoes out after a fashion, but I gave them the suggestion that they label their potatoes with "Grown and Packed by ———." It was surprising to see how quickly their interest rose in that package. Their name was going on it, it was going to be carried through the Commission House, through the hands of the retailer into the hands of the consumer, and it meant that if they did not put up a standard product or put in anything which was undersized or did not have any business to be there, it would not be in the hands of the commission man and then it was up to him—the farmer's name was on it. Of course the commission man's was also on, but at the same time the farmer's was on, and he regards what is packed under his name.

The thing to do in putting this stuff on the market is to put the name of every producer on his product. I was speaking last week to a man who referred to Mr. Burpee, saying, "I like Mr. Burpee all right, but for every five words he says, he says Burpee seven times." We in our business don't hesitate to talk "Self" to the retail dealers in Philadalphia—talk your name; it is the thing you want to get before the public. You want to keep their trade, and to keep their trade you have got to keep your name before them, and that name must stand for quality produce, to be of value.

That brings to mind another thing: You have got to give the public what they want. You say, what is the use of all this flossy business of wrapping celery in waxed paper? What do we care? The people want it, and if they are willing to pay the price, we give it to them. We are getting from two to three cents a bunch more for that celery. That is our business. We in this line of business of producing have been too thoughtful of our own ideas and not thoughtful enough of the consumer. In this line of advertising, as I say, we are talking our own name and are talking it all we can. We put that name on the tops of the strawberry crates, we put it everywhere that we can possibly get it, and when the goods are right, we have increased the demand for our produce.

Let me give you another illustration of this: A couple of years ago I was watching Italians picking strawberries, and the thought occurred when watching them that we might take a little more trouble in packing them. So we began having those strawberries packed with the stems all in one direction on the diagonal across the face of the box. We put possibly another half a dozen berries in the quart. We did not put the very best berries on the top, but we saw that those that were placed on the top had their best face turned upward. When these berries came into Philadelphia the next morning, it drew the trade around the store and everyone was commenting on the choice strawberries and we sold them at twenty cents a box. Jersey berries at that time were bringing eight cents a quart, and we had geen getting twelve cents. I figured up the Italian boy's time in sorting those berries over, and I found that it had cost twenty-four cents extra per crate on account of the extra packing. By spending the twenty-four cents we increased the value of the berries by $2.56 per crate. You know how the women fall for appearance—then give them appearance if they are willing to pay for it. The thing is to conduct your business in such a way as to please the consumer.

New Hybrid sweet corn varieties and tomato crosses, showing by means of ribbon the parent stock from which they were produced.

We have been trying to do some work out in our locality in the way of co-operation. We have not accomplished anything very definite yet. I thought this morning what a wonderful thing it would be if you market gardeners co-operated in the way of having one every day in the week selling your produce and advertise under "Ontario Vegetable Growers' Association" name. If you are not large enough to carry on your daily marketing individually, you can all combine and have your goods sold under the name of the Association, so that you would create to a certain extent what your meat men have in your market. I saw down at the St. Lawrence Meat Market this morning some of the most ideal meat stalls that I ever saw in travelling through the eastern country. They have everything that tends towards sanitation. I do not believe that, individually, you could do anything of the sort, but collectively you surely could. Those meat men are represented there daily. There is an awful lot of talk in the United States about the high cost of living, but the people seem to think it is worth the price. They want style and good looks. Quality, of course, is essential, but it is in a sense secondary. If you have all of these three things first and then have quality, you will have all that is needed. Now if the meat people can do this, why can you not get your vegetable market on the same plane? I saw celery in the market this morning—it was tied up in bundles. They called it "Hearts of Celery," about twenty stalks I suppose in a bundle. Suppose an individual would take a little more care of that, tieing it up flat, I believe you would get from two to three times as much money out of it.

In years when there is over-production, who is the man who is going to come out square in such a year? This is a time when we are giving very serious thought to the financing of market gardening. The keynote of every convention is the business side of gardening. Who is going to come out right when there is over-production and prices are low? It is the man who puts his goods up in an attractive manner and guaranteed. Last year there was plenty of celery on the market, but we were getting 12 cents a bunch when the average celery was selling for 8 cents. The 8-cent celery was just as good, but the 12-cent was getting more attention. I was thinking to-day when you were speaking of giving prizes for the product as it stands in the field—that the prize should go to the man who has the best looking product when it is brought to market. I look at it from the finished product standpoint. Looking at it when it is in the field is all right from the scientific standpoint, but the man who puts it up so as to get the most dollars is the man who, I think, earns the prize.

J. W. Rush: I would like you to understand that the men here are rather slack on the market question. The markets are all over the highways and by-ways. I live about five miles from here. There are Italians by the dozen out there waiting for every waggon that comes along. We have no trouble in disposing of our goods, because these fellows come out there and grab everything they can.

H. W. Selby: Do you mean these are hucksters?

J. W. Rush: Yes.

H. W. Selby: I am glad you brought that point in. We have a lot of those Italians, Hebrews, etc., but we are getting tired of raising the kind of food that they eat. They do not pay much for the package. And you notice that the Italian is just about slick enough to take, for instance, apples he buys in this way to his stand, put them up in an attractive manner, and when you go to buy them from him his price is just about double. Is that not a fact?

J. W. Rush: About the package, I never saw those boxes returned to any store. They take anyone's boxes with anyone's names on their waggon, and that is the last you see of it.

H. W. Selby: We had that same proposition at home. We bought a box which cost us 20 cents. We stamped our name on it, and made it redeemable at 20 cents. We sold it right out, and the box was brought back to the store, the customer then getting credit for it. The box had a handle on it, and the grocer would keep it for a day or two and longer—it was handy; next the driver would take it out to deliver his orders; then it was left with the cook; then down to the cellar and used as an ash receiver, and altogether it was in wonderful condition when it came back. But we had to give the 20 cents back on it—it had our name stamped on.

J. W. Rush: We don't get any 20 cents for our box.

H. W. Selby: We did better than you then. We got 20 cents, but, as I said before, had to redeem it. Now we are getting away from it. We only pay 10 cents for lighter boxes now, and we do not redeem them at all. We want a clean, fresh box every time, and we are getting up to the point now of using new strawberry crates and new boxes for every berry that comes out of our section. The people want to pay the price for it, and we are making money on it.

A Delegate: Have you ever tried boxes with lettuce?

H. W. Selby: Yes, we tried it out, but last year it was a failure, as we only got 10 cents for our lettuce. We tried it out the previous year. Lettuce has been put on our market in barrels with 40, 50 and 60 heads, and in packages of 24 heads. On 40 to 50 per cent. of it we got as much for the packages as for the barrel. The brother here mentioned a minute ago about these markets around the town. I presume that they are waggon or curb markets where you back right up. I can just about picture that in mind. I was in Montreal a few years ago—I think it is the Jacques Cartier Market—where they dump things on tables and on the sidewalk, and it is not pleasing at all. It does not look like sanitation or any of the modern things which we like to think about.

There is another matter which I find is troublesome in some sections, and which I spoke on this morning: the word "co-ordination." I do not know whether this will apply here or not, but it would in Bedford county, Pennsylvania. There is the man who will ship in here to Toronto, and then those goods, after they have been held here twenty-four or forty-eight hours or more, will be shipped right back to some little town or community where they are not making a study of the various markets, but who have been rather leaving it to the trade of Toronto. Why cannot you get the price that they are getting in the village five or ten miles from the place, rather than have to pay the freight, cartage and commission? We overlook those little places. Do you know that in Philadelphia we re-ship 33 per cent. out to other points? We receive apples from one section in Pennsylvania, 125 miles away from us, and ship some of it back to the same point. It is a costly operation, and it is removing from the farmer a lot of the profit which is rightfully his. Of course in my commission end of the business I ship out wherever I can. Now if you are a large gardener you must specialize either in the market or in the garden. I think I can say this frankly, that the commission man will take from you all the products he can get. But for you to ship in here to Toronto and to ship to a man on commission, he is only charging you 10 per cent., how much better that is than to sell it to the man in your own railway station on a cash basis, who, nine out of ten times, is going to make 20 to 30 per cent. on it. The commission man here in Toronto can well afford to sell your produce on a ten per cent. basis.

W. H. F. Patterson: Do they do any order business? For instance in the Niagara district in the fruit line about half the business is sold on orders straight. They sell straight to the retailer, eliminating the wholesale altogether.

H. W. Selby: Wherever that is possible. It takes quite a complete organization to handle it that way. It costs 8 per cent. anyway to handle. That is, in a sense, maintaining your own commission house, and seems possible under what I mentioned before for you to have your Ontario Vegetable Growers put up a stand which will be reputable and which will be a credit to your Association. You will not then be ashamed to say you are a member of that Association. You will be rather proud of your collective style of marketing rather than be ashamed of your individual style. This is all theoretical, of course. I have lots of other thoughts in mind, but they are rather incoherent. I like this way of discussion—that is what made our Cleveland Convention such a success, we had a round-table discussion.

How about that line of transportation? Do you have difficulties in that respect? Everything, I suppose, is done by horse and waggon, and you are in close proximity to your market?

Thos. Delworth: Toronto gardening is done that way. Our gardeners mostly live within ten or twelve miles of the city. Very few Toronto market gardeners deal direct with the consumer. Most of us sell to the retailer.

H. W. Selby: Let me tell you how Philadelphia gardeners are making the motor truck pay for itself. Suppose there is a great demand for lettuce. The retailer will in the morning telephone the gardener: "Lettuce is high, can I take orders for it for delivery later in the day?" That farmer will get his Italian gang out and within three or four hours he will have another load of lettuce out to the city. With the motor truck you can handle this much cheaper than with horses and wagon, and of course more quickly.

J. J. Davis: I suppose you can depend on the motor truck to take your stuff to the market the whole year?

H. W. Selby: We have gone through some snow which has been right up to the axle of the machine. I suppose, however, your storms are very severe here. Do you have very much to market right in the middle of the winter season?

J. W. Rush: Yes, every day of the week.

W. H. F. Patterson: Motor trucks are very much used on the Hamilton market. It seems to me the people in Toronto are very far behind Hamilton people in the market. They have a magnificent market there—they sell in small packages. It is a continuous market, day and night, they use an enormous number of motors—these take three or four people's produce to the market, and just charge them a percentage on the sale.

Thos. Delworth: I don't think curb markets are a desirable thing to encourage. They are always unsanitary. The last time I spent a night in Hamilton was market night. I went around about eleven o'clock Saturday night, and I thought those men were earning their money.

W. H. F. Patterson: They close up at nine now Saturday nights. In the summer season they have a continuous market night and day from Monday morning at seven o'clock to Saturday night at nine, and they sell the stuff. One man takes from $500 to $1,000 out of Hamilton in one day. Numbers of Toronto people buy in the Hamilton market all the time.

Thos. Delworth: Yes, because it is cheap.

W. H. F. Patterson: No, it is not a cheaper market. I do not think there is a market where the farmers get better prices.

J. W. Rush: Years ago, when I was a younger man, they used to make a business of going up to Hamilton on Friday. I would take the night train, I would buy a couple of hundred dollars' worth of stuff, it would get in here about ten o'clock Saturday morning, and I often made $50 or $75 on what I bought from there, so it must have been a cheaper market than Toronto, and as for the amount that they sell, certainly a city like Hamilton, 40,000 or 50,000 population, would not sell as much as Toronto, with 500,000.

W. H. F. Patterson: Hamilton is an immense distributing centre, a lot of people from outside go in to buy.

J. W. Rush: One of these gardeners at Newmarket runs a little truck into the St. Lawrence Market once or twice a week, lately he has been bringing celery, 150 bundles tied up a dozen to the bundle, and he has been in the St. Lawrence Market only twenty minutes when the whole load was cleaned up. It reminded me of the London markets. It is surprising how they grab up good stuff here, the same as in Philadelphia. There is celery coming in now from Armstrong, B.C.; the best celery you get in Toronto is from there. This is brought in 2,500 miles because there is none in Ontario like it, so you see if they grow the right stuff there is a market for it every time, no matter what it is.

H. W. Selby: Lots of people can pay the right price for good produce carefully packed, so what is the use of catering to the Italians? Have any of you questions on advertising?

Thos. Delworth: Do you think it would pay the individual gardener to advertise if his gardens are limited to about four to twelve acres?

H. W. Selby: I do not believe I could answer you. If they were 225 acres it would be a different thing, but I believe in the height of the season you could call attention profitably to your product by advertising. There is a gentleman, Mr. Hale, Chairman of our Seed Service Committee in the Pennsylvania Vegetable Growers' Association. His gardens are not very extensive, and he advertises to a profitable end, but he only does that advertising when his stuff is plentiful.

Thos. Delworth: Do you think advertising would pay in the daily papers in a city like Toronto?

H. W. Selby: Yes, if you were standing in a popular market and carried out the ideas of standardization, neat packages, etc. Let me show you in our commission house how we are able to carry out a scheme which will make immediate sales. We keep a record who buys certain goods during one year. We have a car of apples coming in—we have a record who used those apples last year. We call up the people on that list and get rid of the stuff to them very quickly in that way. Likewise with potatoes. We have a list of the people who used that farmer's potatoes. We call up the people who used them last year, and if they gave satisfaction you can bank upon them wanting them again. They will pay, possibly, a slight premium over the average market quotation; in any case you get results to warrant you in putting up your goods in the proper manner and in giving them the proper product.

A Delegate: What if the apples were not quite as good as they should have been?

H. W. Selby: The next time the people came back they would want another mark or brand, and they would keep on until they found the right article. This business of market gardening is going to be a case of "the survival of the fittest." We are going to get in America an overflow in the field of market gardening, and it is the fellow who puts up his package right who is going to come out with the profit every time. The potato market with us rose until last Monday it struck 78 cents. Then the market dropped from 78 to 75 cents. This was because the farmers throughout the State were anxious to market at 78 cents rather than put them in storage. When those potatoes dropped to 75 cents we had several thousand bushels in our store which we held at 80 cents, and we sold at that price while the market continued at 75 cents. That was because we had a standard product. The people knew what they were getting in buying that potato.

J. E. Britton: Would you advertise in a general way towards increasing the consumption of vegetables?

H. W. Selby: We had a man here this morning who suggested to my mind a thing which I have often spoken of before. We are raising rhubarb, turnips and celery, but how many people know what to do with it after they buy it? The reason for the small demand to-day as compared with the production is the fact that the vegetable is not properly prepared for the table. In this matter of how we would prepare for a greater consumption of vegetables, Dr. Pearl McDonald advocates training the women how to prepare the vegetable after they buy it, and I am beginning to realize more and more the truth of that contention. Suppose in the spring you were to buy a little advertising space as an association. Rhubarb is a spring vegetable. Advertise to them that rhubarb is a spring tonic, tell them of the medicinal qualities of rhubarb. Mr. Emsley is a man who has knowledge of chemistry and could write up the facts and benefits from eating rhubarb. You could get eminent writers who are medical men and scientists to furnish the facts. How many of you here have eaten stewed celery? I see there is a larger proportion in this convention who have eaten this vegetable stewed than I ever came across in a similar gathering. But do you know I have never suggested stewed celery to anyone but that they, after trying it, have continued eating it, and it is a fine food. But we do not advertise these things. We can't do it as individuals, but we can do it as an Association. That is one of the instances where you can put your "co-operation into operation."

J. W. RUSH: I think our Ontario Government here must be somewhat like your Pennsylvania Government in reference to training the women. We have throughout the Province of Ontario a very enterprising lot of women, and they go under the name of "The Women's Institutes," and it is backed up by the Government. One of the principal things of these Institutes is to train women who have not had sufficient training in their earlier days to keep house.

H. W. SELBY: I am glad to learn that such a thing is in vogue here in Canada. I do not know whether Dr. McDonald is in touch with that sort of work or not, but we would surely I think sell more vegetables, and consequently have scope for greater production, if the women really knew better how to utilize and prepare that vegetable for the table. Now to show the willingness of the newspapers to take up with that sort of thing. Last year I was in a section of Pennsylvania where they raised the Ewalt apple. This fruit was entirely new to our trade. To introduce that apple I took two barrels, divided them up in small portions of about 1/4 of a peck each in paper bags, and asked our trade to take them home and make apple sauce from them. They did this, and we could have sold three times as many apples as Bedford county, where they were grown, produced in that year. *The Philadelphia North American* gave us a whole page, and advised the women to ask for a certain kind of apple. There are so many who ask for half a peck of apples, and not for any specific variety according to its use. I came across an apple which is a perfect wonder for baking, the Norton's Melon; and there are other apples, all of which come in for particular purposes and have their place, and I consider it is the case with lots of other products. We have to train people to know what they need. If you will carry out the method of the home hamper through your departmental stores, the sooner we get at that the sooner we will have great results from it. Mr. Fullarton, out at Long Island, tried the hamper specially adapted to four or five of a family, and shipping that hamper with charges collect, and he made quite a success out of it. You could advertise in to-morrow morning's newspapers, giving suggestions to the women on the menu—of course you have not the variety at this season. In the spring and summer season you can advertise to better advantage, and there is nothing that the women like better than suggestions as to what they are to have for their meals. We have tried this out to some extent. Get down to the individual package and suit the needs of the customer and you will find that that will be the basis of successful selling.

SOME RECENT EXPERIMENTS IN THE CONTROL OF CERTAIN VEGETABLE AND FIELD CROP INSECTS.

Arthur Gibson, Chief Assistant Entomologist, Department of Agriculture, Ottawa.

The Entomological Branch of the Dominion Department of Agriculture has recently been conducting important experiments in the control of such serious pests of the market gardener as cutworms, root maggots, locusts, etc. It is highly advisable, therefore, at this meeting to make a brief statement of some of the results of our work before such an organization as the Ontario Vegetable Growers' Association, in order that the members may profit by the information before the growing season of 1916. The Entomological Branch desires to help market gardeners in every way it possibly can. The growers themselves may also help those of us who are working on insect problems of vegetable and field crops by reporting promptly serious outbreaks of insects and sending specimens for examination and study. A closer co-operation between the entomologist and the grower of crops will certainly result in mutual benefit.

Locusts.

These insects do not every year seriously affect vegetable crops, but there are seasons such as 1913, 1914, and 1915, when locusts are enormously abundant, and at such times important losses take place in market gardens. These insects, particularly the species known as the Lesser Migratory Locust, *Melanoplus atlanis,* have been so abundant in certain parts as to compel the farmers to abandon their farms. In June last, I saw a number of such abandoned farms in several parishes in Quebec Province. In 1914 and 1915, we had excellent opportunities near Bowesville, Ont., and at several points in Quebec Province, to demonstrate the value of poisoned baits to destroy these insects. Our work in 1915 was on a larger scale than that conducted in 1914. At Bowesville, over twenty experiments with various baits were conducted, each on an area of not less than five acres. All of these experiments demonstrated the killing power of the mixtures used, but it is only of a few of those which gave the highest death counts of the locusts that I wish to call attention to-day. The Kansas formula recommended in our Entomological Circular No. 5, is as follows:—

Bran	20	pounds.
Paris green	1	pound.
Molasses	2	quarts.
Oranges or lemons	3	fruits.
Water	3½	gallons.

The mixture is prepared as follows: the bran and Paris green are mixed while dry. This may be done in an old wash tub, or box, or on the floor of an outhouse. The juice of the oranges or lemons should be squeezed into the water and the the pulp and peel chopped into fine bits and added. The syrup may then be poured into the water and when dissolved the whole should be poured slowly on to the bran and paris green, stirring at the same time so as to thoroughly dampen all the bran. The tub or other vessel in which the mixture is prepared should be washed out thoroughly or placed where live stock will not get access to it.

In 1915 certain changes were made in this mixture, as for instance in the strength of the poison used, the possible difference as an attractant between lemons and oranges, and in the amount of water required to make the mixture spread easily. Other materials used as carriers for the Paris green, such as shorts and sawdust, were also experimented with. Promising results were obtained where sawdust was used, but shorts made too sticky a mixture and one which we found difficult to spread properly. Bran makes an ideal spreader, the poison adheres to the flakes and the mixture on the whole is easy to prepare. Sawdust also mixes fairly well, especially where it is used with bran. Briefly, the mixtures which in 1915 gave the best results are as follows:—

	Mixture.		Average of dead locusts per square yard.	Cost of application per acre including labour.
1.	Bran	20 lbs.	222	19 cents.
	Paris green	½ lb.		
	Molasses	2 quarts.		
	Oranges	3		
	Water	2½ gallons.		
2.	Same as 1 except that 1 lb. of Paris green was used instead of ½ pound		406	21 cents.
3.	Bran	20 lbs.	514	27 cents.
	Paris green	1 1-6 lb.		
	Molasses	4½ quarts.		
	Water	2 gallons.		
4.	Sawdust	20 lbs.	228	7 cents.
	Paris green	½ lb.		
	Salt	¼ lb.		
	Water	3 gallons.		

Other mixtures, in which half the quantity of bran was replaced with sawdust, also gave promising results.

In applying such poisoned mixtures it should be remembered that the 20 lbs. of carrier are sufficient to treat five acres of crop. Such a quantity is not intended, of course, to cover the whole of the five acres. The mixture is applied by hand, being simply scattered as one would sow grass seed. Scattering the mixture thinly does away with all danger of poisoning to chickens or other domestic animals. The locusts are readily attracted to the mixtures and will hop considerable distances to reach the same. Early morning between four and seven o'clock is the time to spread the bait, and such application should be made before the locusts become winged, preferably when they are about half an inch or a little more in length. Farmers and market gardeners should co-operate and apply the poisoned bait as near as possible on the same day.

CUTWORMS.

Vegetables of all kinds suffered severely from cutworms during 1915. In Eastern Canada the species which caused most destruction were the Red-backed Cutworm, the Striped Cutworm and the Dark-sided Cutworm. The habits of these species are similar and all are surface feeding cutworms. These and other common cutworms are discussed at length in our recently published 31-page bulletin on "Cutworms and Their Control," which any member of this Association may receive on application to the Chief, Publication Branch, Department of Agriculture, Ottawa. During the past season the poisoned bran remedy with fruit added as recommended for locusts was used in our experiments near Ottawa and outbreaks of cutworms quickly controlled. In one large field of onions where the cutworms were especially abundant and destructive a single application of the poisoned bait stopped the outbreak and no further injury by these insects took place. The 20 lbs. of bran mixture has been found sufficient to treat about three acres. The poisoned bait should be spread thinly in order to destroy the greatest number of cutworms, and when thus spread there is no danger of birds, poultry or live stock being poisoned. A single poisoned flake of bran is sufficient to kill a cutworm. Like the old poisoned bran bait, the new mixture containing fruit juice should be distributed over the land in early evening so that it will be the best condition to attract the cutworms when they come out to feed at night. This new poisoned bait is a cheap, reliable remedy for cutworms and should be promptly used by every grower on the first sign of injury by cutworms. If the cutworms are known to be present in the land in spring it is a wise precaution to scatter the poisoned bait after the ground has been worked and several days before seeding or planting. In widespread infestations of cutworms in 1915 we observed that the eggs had undoubtedly been laid during the late summer of 1914 on weeds, or other plants growing on higher locations and left standing, and that the cutworms which hibernated nearby in their younger stages, migrated in May to other parts of the field where food was plentiful. The importance of keeping down weeds and other useless plants so that the cutworm moths will not be attracted to the land for egg-laying purposes is therefore very important. If in spring the cutworms are noticed to be working chiefly on the higher elevations, large numbers may be destroyed before they begin to migrate by prompt application of the new poisoned bait.

ROOT MAGGOTS.

We have this year continued our experiments on the control of root maggots and have again thoroughly demonstrated the value of the felt-tarred paper discs to protect cabbages and cauliflowers. In one field near Ottawa, owned by a prominent market gardener, we placed these discs around about 1,600 plants at the time of planting. Before this planting the grower had lost a large percentage of his early cauliflowers, and even after we applied the discs to the second planting of 1,600 plants, many plants in adjoining rows were rendered useless owing to attack by the maggot. Of the 1,600 plants above mentioned practically the whole number were protected from the maggot. This was an excellent demonstration of the value of the disc and will undoubtedly lead many of the Ottawa growers to adopt this form of protection next year. It is practically the only satisfactory remedy which we have for protecting cabbages and cauliflowers from the ravages of root maggots.

Experiments were also conducted with poisoned bait spray to attract and kill the adult flies before they deposited their eggs. This work, however, we hope will be continued next year. In Wisconsin a poison spray which has been used successfully to kill the Onion Maggot Fly is made in the proportion of five grains of sodium arsenite dissolved in a gallon of boiling water into which is thoroughly mixed one pint of molasses. This mixture is applied as a coarse spray of large drops once a week in strips across onion fields throughout the summer. It is claimed that the results show almost a perfect control of the insect at a cost of from 50 to 75 cents per acre for summer treatment. At Ottawa this year we also continued our experiments with various mixtures applied by means of a watering-can to rows of radishes, etc., to destroy the eggs and young maggots. In small gardens three applications, made once a week from the time the plants appeared, of 2 ounces of white hellebore to one gallon of water or fresh pyrethrum insect powder in the same strength, again gave fair results, as did also mixtures containing borax. In one experiment in which borax was used at a strength of 1½ ounces to the gallon of water, only 9 per cent. of the radishes were found to be infested by the maggot, while in a check row close by as high as 60 per cent. were infested.

WHITE GRUBS.

In co-operation with the United States Bureau of Entomology, we are making a study of the various species of white grubs which are so destructive to garden and field crops. These grubs feed naturally on the roots of the various grasses, and where grass land is ploughed up and used for agricultural purposes, their natural food is thereby reduced and crops planted on such land are often attacked, particularly if the same is potatoes or corn. During 1915 white grubs caused much damage in Canada. In the United States in Iowa, Wisconsin, Illinois, Michigan and Ohio corn-growers have this year lost millions of dollars owing to the ravages of these grubs. The species of grub which this year was so destructive requires three years to complete its life-cycle, and a warning was recently issued by the entomologists of the United States Department of Agriculture for the year 1918. The grubs of this particular species will be more or less destructive up to the end of May or early in June, 1916. They will then make earthen cells in the ground preparatory to changing to the beetle state. The beetles from these grubs do not leave the soil until the spring of 1917, when they will appear and lay eggs in land covered with vegetation such as where crops as the small grains and timothy are

A currant worm attacking the foliage.

being grown. Land overgrown with weeds will also undoubtedly attract the beetles. In 1918, therefore, such land to which the beetles will likely be attracted in 1917, should not be used for such crops as corn, potatoes, or strawberries. Land in which white grubs are now known to be injuriously present should be ploughed, if at all possible, as soon after the middle of July, 1916, as is practicable. The date July 15th is specially recommended by the United States Department of Agriculture for the above mentioned states and will doubtless apply also to Ontario, particularly the southern portions. The ploughing, of course, is to break up the tender pupal and beetle cells which results in the death of the insects. A plough which will break up the soil is, of course, preferable, but if such an implement is not at hand, the ground should be deeply disked. Chickens are fond of these grubs, and if available should be allowed to remain in the field during cultivation. Hogs are also useful in ridding small areas of white grubs.

THE VEGETABLE WORK AT VINELAND WITH SPECIAL REFERENCE TO SEED IMPROVEMENT.

F. M. Clement, Jordan Harbor.

I was very much interested in Mr. Selby's remarks, especially regarding the packing of vegetables. The whole idea now seems to be a little better package than we used to have. Then the idea of advertising. I cannot answer entirely from the vegetable grower's point of view, but I know in regard to fruit, as I am on a committee for an advertising campaign to deliver the fruit crop this year, and we got results. By doing that in the Niagara Peninsula the farmers were able to market their crop without any loss. They had assistance from the Dominion Government, but still the growers supplied $2,000 or $3,000 towards the advertising scheme.

Until this year the vegetable work has been developed in a more or less haphazard manner, but now we have a specialist in charge, Mr. O. J. Robb, a graduate of the Agricultural College, who will devote his whole time to it.

We are working along various lines, conducting experiments on various methods of production, improving seed by breeding and selecting seed. In spite of somewhat adverse weather conditions, we have this year been able to get away to a good start. The principal work in breeding has been conducted with tomatoes and cucumbers. Many varieties and strains of varieties under various names are on the market to-day, and it is very difficult for the grower to obtain commercial seed of uniform quality of a variety from year to year, consequently a great many are selecting their own fruits and saving the seeds. Pure strains are usually aimed at but on the supposition that the seeds of the first generation will produce more vigorous and thrifty plants and consequently more and larger fruits, an attempt was made this year to compare the pure strains with the seeds of the first generation. Tomatoes were grown from seed selected as follows in 1914:—

Bruce's First and Best x Royal Red.
" " " " x Chalk's Jewel.
" " " " x Earliana.
" " " " x Ponderosa.
" " " " x Livingston's Stone.
" " " " selfed.

Thirty-six crosses were made in all combining these varieties in as many different ways as possible. The pure strains gave an average yield of 727.6 bushels per acre and the first generation seeds of first crosses gave an average of 753.8 bushels per acre, 26.2 bushels per acre in favor of the first crosses. The question of earliness is an important one also but on it no data are available except that Bruce's First and Best x Earliana gave at the first picking a few more tomatoes than either pure Bruce's or pure Earliana.

Following a suggestion of your president last spring, a start has been made in cucumber breeding and selection under glass. Our tests show that the Telegraph, representing the long English type, will set fruit without pollination. This has been your experience also. On six tests made all developed normal fruits, five being seedless and one having a few not fully developed seeds. On the other hand, tests with the White Spine and Fordhook Famous show that from six tests but one fruit set normally and had poorly developed seeds while the others set no fruit at all. This indicates that though varieties of the White Spine type will set some fruit without pollination, to insure fruit in quantity the blossoms must be fertilized. Crosses have been made between these two types and a quantity of fully developed seeds obtained. From them with continued breeding and selection, it may be possible to get a cucumber of the White Spine type that will set without pollination. At any rate the possible result is worth an attempt.

This spring, a planting was made of certain varieties of asparagus for test including Giant Argenteuil, Dreer's selection of Argenteuil, Dreer's selection of Conover's Colossal, Palmetto, Barr's Mammoth, Dreer's selection of Barr's Mammoth, Dreer's Eclipse, Columbian White and a strain selected by the late Mr. Lund. Some work has also been started in a selection of peas with Abundance, Alaska, Gradus, MacLean's Little Gem, Thomas Laxton, Telephone, Champion of England and Horford's Market. The work has not progressed far enough to report on in detail.

Under the irrigation system we conducted tests on asparagus for quantity and quality, the watered plants giving 33.1 per cent. more than the unwatered in quantity; tests for the quick germination and maturity of beets, carrots and onions; tests on celery for quick growing and quality with regular applications of nitrate of soda.

The biggest work and the one you will be most interested in is that of the attempted production of beet, carrot and onion seeds. It was held a year ago that because of conditions prevailing in Europe it was possible that certain seeds would be unobtainable or be very high priced this year. The trouble has not proved to be as bad as it looked, and certain seeds are obtainable, but the effect has been all that could be desired. Why should we not grow our own vegetable seeds? A quantity of onion bulbs, beet and carrot roots were sent us by Mr. Johnston, and we endeavored to store them for use the following spring. The beets arrived in good condition and the onions also. The carrots were slightly frosted in transit and some were lost through decay. The whole attempt, however, has been fairly successful.

It is very interesting to know that though Ontario has more than 55.000 acres planted to garden crops annually, scarcely any direct interest has been taken by breeders and specialists in the improvement of the seeds. Outside of the market gardening and truck farming areas, vegetables have been more or less a side line. Seed, however, must be supplied annually for this area of crop and I am glad that an opportunity has opened for study of the whole question. A very small proportion of the required seed is produced in Canada. Then, too, when looking over the lists of the Canadian Seed Growers' Association and others I fail to find any who are making selections with the view of improving garden beets, onions, celery, carrots, cabbage, and other garden crops. Oats, wheat, corn, beans and such crops are given a prominent place, largely, of course, because of their relatively great importance but partly also because of the ease with which seed is produced. Garden crops, on the other hand, with the exception of tomatoes, peas, beans and corn, are largely biennial or perennial, such as asparagus and rhubarb, and two or more years are required before seed is produced. Another reason why some of these crops are neglected is because they mix badly when grown closely together. Most of our grains will not do this. Peas are a good example and consequently the development of pure strains of this vegetable is a much easier task than with onions, beets, carrots or even tomatoes. It seems necessary first to demonstrate also that seeds of these vegetables can be grown in Canada; that they can be grown profitably; that the product is equal to the imported product and that the present methods of selection for improvement are leading to the desired end.

It already has been demonstrated that seed can be grown in Canada, but not that it can be grown successfully year after year in competition with the European product. Experiments at Guelph and Macdonald College, Que., show that home-grown seed is equal to imported seed, and at Macdonald some pure strains of field roots have been selected. We can then very hopefully expect that in the next few years good results may be obtained from breeding and selection work in garden vegetables.

Returning more to the practical side of the work the question of storing for the winter is an all important one. In connection with the Denia bulbs sent us, some were stored in a dry cellar, some in cold storage, and some were buried in dry sand. Those stored in the cool, dry cellar kept best but still the loss was more than 50 per cent. Even a great many of the bulbs that appeared quite firm and good failed to grow. Some that did send up stalks were not thrifty and the quantity of seed set was very little. The experiment was largely a failure. The few bulbs of Ailsa Craig and Red Weathersfield onions did well and the seed is a good sample. The main onion work, however, was with the Yellow Globe Danvers. All bulbs were carefully graded into four sizes: very small, small, medium and large. One hundred very small bulbs averaged 217 ounces; one hundred small bulbs averaged 294 ounces; one hundred medium bulbs averaged 470 ounces; one hundred large bulbs averaged 700 ounces. In addition to this, selections were made of the best individual bulbs, globular in type, flat in type and intermediate in type. These were grown separately and the seed harvested separately from each individual, to be grown in 1916 in separate rows. The best of these will be used to develop strains or certain types in future experiments. The quantity of seed from the different sized bulbs is not yet available as the seed has not all been threshed and cleaned. This data will, however, be put in the Station report. It is generally supposed that large bulbs will give no more seed than smaller ones and, though all the figures are not yet available, it appears as though the amount of seed produced per bulb is directly proportionate to the size of the bulb. Of the largest onions, 16 were required to give 100 seed stalks; of the medium, 28 were required to give 100 seed stalks; of the small, 36 were required to give 100 seed stalks and of the very small, 38 were required to give 100 seed stalks. This is very important as it largely determines the distance apart the various sized bulbs are to be planted. Our plants were set fifteen to sixteen inches apart in the row with four feet between the rows. But this is apparently a waste of space. Eight or ten inches between the bulbs would have been quite enough. The distance between the rows should be just great enough to facilitate cultivation. Our methods of cultivation were taken entirely from written instructions and articles. The best ideas from these were adopted to our particular conditions. The soil was manured carefully with well rotted farm yard manure and carefully ribbed up the previous fall. The ribbing exposes the greatest amount of surface to the atmosphere and at the same time hastens rapid drying in the spring. As soon as opportunity and general conditions permitted, the soil was thoroughly worked and the bulbs planted on April 14th and 16th. Furrows were plowed about five inches deep and the bulbs placed head down in these. They were then carefully covered with the soil. This left the crown about 1½ to 2 inches below the surface. Cultivation was regular and continuous and as the plants grew they were gradually banked with earth to a height of six inches. This strengthened the stalks so that artificial supports were not necessary.

Wet weather during late July and early August to some extent prevented pollination, but, as a whole, the set of seed was fair and the growth as good as could be expected. The beets and carrots were treated similarly. It is planned if the seed proves as good as it looks to send it out this spring to be tested by growers against ordinary commercial seed. We wish, if possible, to determine the place of Canadian grown seed.

Some of the seeds have already been sown for a germination test. The onions are just breaking through the ground and a part of the beets are well advanced. Of seven tests made with the beets fifty seeds to each test, 55, 37, 39, 88, 51, 68 and 85 plants have developed, an average of 60.4 from each fifty seeds. Onions are not far enough advanced to report on.

In the tomato selection work, there is nothing of value to report. Selections have been carefully made from twenty-five varieties of earliest fruit from earliest plants, latest fruit from earliest plant, from the most productive plant, from uniform fruiting plants, small fruit, large fruit and from all plants that show desirable variations.

We hope from working along these lines to get the necessary data to enable us to select intelligently for certain results whether it be for earliness, quality of uniformity.

The Station is anxious to co-operate with the members of the Vegetable Growers' Association in seed production and improvement, and we only ask that you test carefully any seeds that may be placed in your hands.

A Delegate: How far apart do you have to grow the different varieties of onions so that the seeds will not become mixed?

F. M. Clement: Ours were placed at least 200 yards, that is the Ailsa Craig was 200 yards from the Yellow Globe Danvers, and the Yellow Globe Danvers and the Denia were about 150 yards apart.

A Delegate: Did you have just the three varieties?

F. M. Clement: Yes.

W. J. Rush: Is that seed to be distributed among the growers?

F. M. Clement: The plan is to test that seed carefully first, then apply to the Secretary for the names of those who are willing to test it. What we want to get is the yield of home-grown seed in comparison with commercial, simply to demonstrate the fact, if possible, that home-grown seed is equal to commercial seed, and we are willing to distribute seed if the next test shows up as good as the last one.

Charles Brown: How do you clean the carrot seed?

Prof. Crow: In reply to that I might say that Mr. G. H. Clark, the seed Commissioner, was good enough to send us a small mill. We cleaned some of our carrot seed. It is what they call a Cutter Cleaner and costs $35. We find it perfectly satisfactory for cleaning carrot and beet seed, and we use it for flower seed also, of which we grow quite a quantity, and it is decidedly worth having if you are going to grow any seeds.

J. Lockie Wilson then read a telegram and letter from the Central Canada Exhibition, Ottawa, asking the Ontario Vegetable Growers' Association to appoint delegates to their Fair Board.

The President and Mr. I. B. Farquharson, of Aylmer, were appointed.

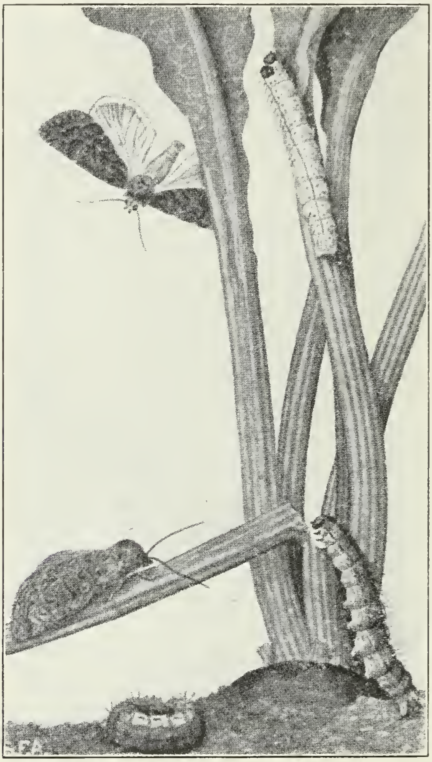
J. Lockie Wilson: Valuable information has come to us through the delegates who have attended the American Vegetable Growers' Conventions. One of the chief things that have accrued to us has been the attendance at our Conventions of prominent vegetable experts from the other side of the line, and the thanks of our Association are due to Mr. Selby and Prof. Waid for their splendid addresses.

C. W. Waid: I wish to thank the Secretary and the delegates for their expressions of appreciation in connection with the American Vegetable Growers' Association. We have only been waiting for the time to come when conditions are ripe for a meeting of that Association in this country, and we hope that the time will not be far distant when more of us can come over to exchange opinions with the enterprising gardeners of Ontario.

The most successful Convention in the history of the Association was then brought to a close by the singing of the National Anthem.

CUTWORMS.

The two common cutworms, the glassy worm and moth above, and the variegated cutworm and moth below, are among the most destructive insects to vegetable garden crops. They emerge in spring ready to cut early vegetation. The worms generally work only at night, attacking plants of all kinds.



Cutworms at work.

Moths are chocolate-brown, white and buff, and grayish-brown, white and clay-colored. The glassy cutworm is pale, shining, greenish-white; the variegated cutworm is dull reddish-brown, with black, white and dull yellow markings, a red spot on the last segment. The dark variety is feeding and the pale form lies curled up on the ground.

On cultivated ground cut plants of no use, poison with arsenates, and spread about in bunches.

INSECTS AFFECTING VEGETABLES.

Aphis. Attacks peas, melons, etc. Use nicotine preparations, or kerosene emulsion, two or three applications at intervals of three or four days, reaching under sides of leaves.

Asparagus Beetle. Use arsenate of lead on summer foliage; cut and burn all vines in late summer.

CATERPILLARS. Various kinds attack cabbage, tomatoes, tobacco, etc. Use arsenate of lead, paris green or hellebore; or pick by hand.

CUCUMBER BEETLE. Yellow and black striped: Use tobacco dust as preventive; beetles carry the germs of wilt. Pick by hand the first bugs in early morning.

CUTWORMS. Fat, sluggish, ground worms, brown with dark stripes, cutting through stems of many plants, especially when just or newly set out. Trap under pieces of shingle or flat stones; or scatter about toward nightfall a mash of one quart of wheat bran, one teaspoonful of paris green or of white arsenate, one teaspoonful of a cheap molasses, mixed with enough water to make a mash. Careful search round a newly cut plant early in the morning will usually uncover the marauder near the surface.

FLEA BEETLE. A small, hard-shelled, jumping beetle, which punctures leaves of tomatoes, potatoes and seedling plants. Use tobacco dust or kerosene emulsion on seedling plants; Bordeaux and lead on tomatoes and potatoes.

MEALY BUG. A scale-like insect with cottony covering. It seldom appears in the vegetable garden. Use kerosene emulsion, brushing with alcohol.

POTATO BEETLE. Use arsenate of lead or paris green. On egg plants use lead only, and pick by hand.

SQUASH BUG. A lively, flat, black fellow. Use tobacco dust, or pick by hand to get rid of old bugs and eggs; use kerosene emulsion for the young ones.

SQUASH BORER. Slit stem near base of plant, and destroy the borer. Cover wound with fresh soil.

WHITE FLY. Attacks tomatoes, and vine crops. Not conspicuous until large numbers have propagated. Use tobacco dust as repellent; spray with nicotine preparations and kerosene emulsion.

MILDEW. Attacks cucumbers, melons, and lima beans. Dust with flowers of sulphur to prevent spread. Use regular Bordeaux-lead spray as an effective preventive through the season.

BLIGHT. Affecting cucumbers, potatoes and other things, in various forms. Spray with Bordeaux frequently enough to keep all new growths covered. Dust with sulphur-lead preparations.

ANTHRACNOSE. "Leaf spot" or "rust," attacking beans, tomatoes and celery. Use Bordeaux mixture or summer-strength lime-sulphur; or ammoniacal copper-carbonate solution to avoid stains on foliage and flowers.

SIMPLE TREATMENT FOR POTATO SCAB.

The value of treating potatoes for scab is well known, but most methods are tedious and impracticable when large quantities of seed are to be treated. Growers cannot afford to take the time to dip potatoes in sacks for forty or more acres or even to handle the dipping solution more than once, so they seldom treat more than is needed for the seed plot.

To do away with the tediousness of treating in sacks or barrels, a simple method by which one man can treat and cut enough potatoes in a day to keep a one-row planter busy is as follows: A 150-gallon tank is equipped with a shovelling board across one end. Ten bushels of seed are poured in and immersed in seventy-five gallons of formalin—one pound of formaldehyde to thirty gallons of water. After two hours these are shovelled out on a draining hopper and another ten bushels are immersed. The draining board is set at an angle so as to slope down to the potato cutter. With the seed supply handy and the tanks and cutter conveniently arranged, one man can cut ten bushels in two hours and can thus treat and cut enough stock to keep one planter busy.

Many growers prefer to cut the seed in the field at the time of planting. In such a case the tank may be hauled directly to the field and filled with the solution. one charge being enough to last a day. Care must always be exercised to prevent reinfection of seed after it is treated.

Cost of treating does not exceed seventy-five cents for fifty bushels of seed—less than twenty cents an acre. The cost may be less if all the treating materials are convenient.

Forty-Sixth Annual Report

OF THE

Entomological Society

OF ONTARIO

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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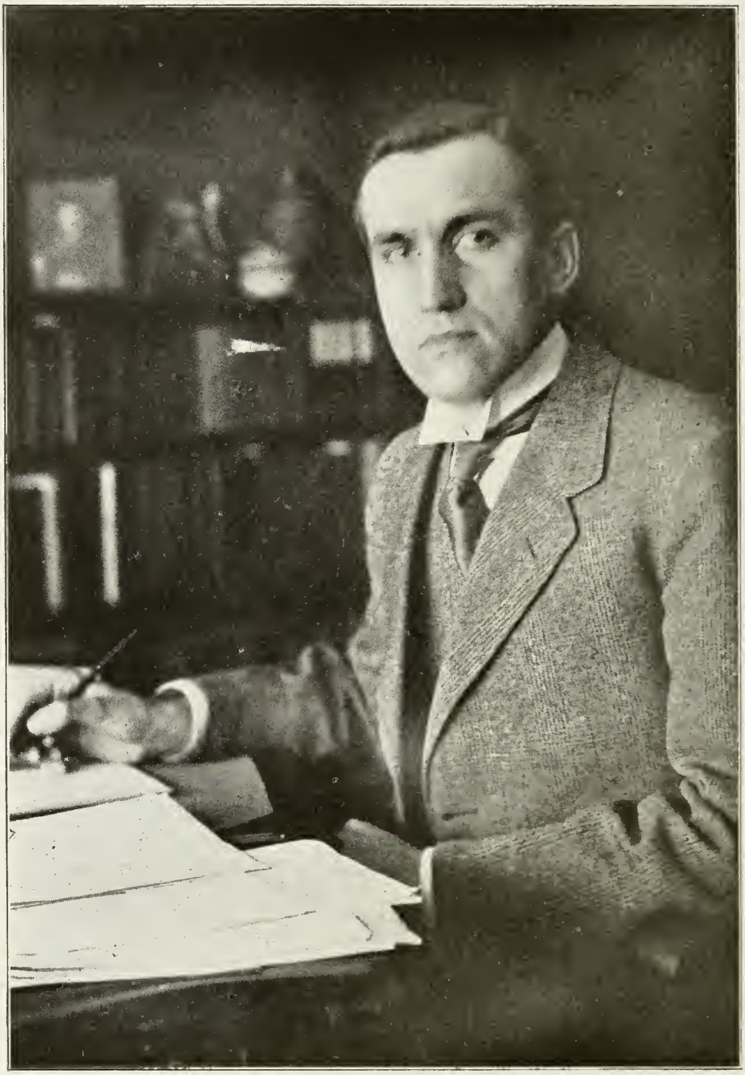
1916



C. GORDON HEWITT, D.Sc., F.R.S.C.
President of the Entomological Society of Ontario, 1913-1915.

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present, for the consideration of your Honour, the Report of the Entomological Society of Ontario for 1915.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1916.

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FORTY-SIXTH ANNUAL REPORT

OF THE

Entomological Society of Ontario

1915.

To the Honourable James S. Duff, Minister of Agriculture:

Sir,—I have the honour to present herewith the Forty-sixth Annual Report of the Entomological Society of Ontario, containing the proceedings of the Fifty-second Annual Meeting, which was held at Ottawa on November 4th and 5th, 1915. This meeting has been generally recognized as one of the most interesting and successful in the Society's history, and was attended by entomologists from nearly every province of the Dominion as well as from the United States and South Africa.

The reports of the various officers and branches of the Society, together with the papers and addresses presented at the meeting are embodied in the following pages.

The Canadian Entomologist, the Society's monthly journal, has been regularly issued and has now completed its forty-seventh volume. A special feature of this volume is the series of papers on Popular and Practical Entomology, which have appeared in each issue throughout the year.

I have the honour to be, Sir,

Your obedient servant,

EDMUND M. WALKER,

Editor.

Biological Department,
University of Toronto.

Entomological Society of Ontario

OFFICERS FOR 1915-1916

President—Mr. Albert F. Winn, Westmount, Que.

Vice-President—Prof. Lawson Caesar, Dept. of Entomology, Ontario Agricultural College, Guelph.

Secretary-Treasurer—Mr. A. W. Baker, B.S.A., Lecturer in Entomology, O. A. College, Guelph.

Curator—Mr. G. J. Spencer, B.S.A., Demonstrator in Entomology, O. A. College, Guelph.

Librarian—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph.

Directors—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Dept. of Agriculture, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. C. W. Nash, Provincial Biologist, East Toronto; Division No. 5, Mr. F. J. A. Morris, Peterborough; Division No. 6, Mr. J. W. Noble, London, Ont.; Division No. 7, Mr. W. A. Ross, Vineland Station, Ont.

Directors (ex-Presidents of the Society)—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Guelph; W. Hague Harrington, F.R.S.C., Ottawa; Prof. John Dearness, Vice-Principal Normal School, London; Rev. Thomas W. Fyles, D.C.L., F.L.S., Ottawa; Prof. Wm. Lochhead, B.A., M.S., Macdonald College, Que.; John D. Evans, C.E., Chief Engineer, Central Ontario Railway, Trenton; Prof. Tennyson D. Jarvis, Grimsby Beach; Prof. E. M. Walker, B.A., M.B., F.R.S.C., University of Toronto; C. Gordon Hewitt, D.Sc., F.R.S.C., Dominion Entomologist, Ottawa.

Editor of "The Canadian Entomologist"—Prof. E. M. Walker, Toronto.

Delegate to the Royal Society of Canada—Mr. F. J. A. Morris, Peterborough, Ont.

FINANCIAL STATEMENT

For the Year Ending October 31st, 1915

Receipts.

Balance, 1913-14	$492 32
Dues	85 50
Subscriptions	439 30
Advertising	42 71
Government grant	500 00
Reports and back numbers	263 01
Cork and pins	157 99
Bank interest	9 68
	$1,990 51

Expenditures.

Cork and pins	$129 99
Printing	1,249 01
Expense	27 90
Salaries	250 00
Library	77 35
Annual meeting	86 60
Annual report	112 00
Insurance	26 00
Bank exchange	7 84
Balance on hand	23 82
	$1,990 51

Auditor: J. E. Howitt.

Respectfully submitted,
A. W. Baker,
Secretary-Treasurer.

LIST OF MEMBERS

ONTARIO.

Addy, Paul H.	Jordan.
Astwood, J. C.	Port Arthur.
Auden, K. F.	Toronto.
Baker, A. W.	Guelph.
Bicknall, H. E.	Toronto.
Brimley, J. F.	Bloomfield.
Burrows, A. R.	Guelph.
Caesar, Prof. L.	“
Calvert, J. F.	London.
Chrystal, R. Neil	Ottawa.
Cleeves, A. C.	Guelph.
Cosens, Dr. A.	Toronto.
Craigie, E. H.	“
Crawford, H. G.	Wilton Grove.
Curran, H.	Guelph.
Dearness, Prof. J.	London.
Doherty, T. K.	Ottawa.
Duff, G. H.	Hamilton.
Duncan, R. S.	Port Hope.
Dunlop, James	Woodstock.
Evans, J. D.	Trenton.
Fouse, C. M.	Toronto.
Gibson, Arthur	Ottawa.
Grant, C. E.	Orillia.
Grant, L. J. M.	“
Hahn, Paul	Toronto.
Haight, D. H.	Sudbury.
Hannibal, J.	Toronto.
Harrington, W. H.	Ottawa.
Harrison, G. T.	Thorneloe.
Hewitt, Dr. C. G.	Ottawa.
Hood, J. R.	Clifford.
Howitt, Prof. J. E.	Guelph.
James, F. W.	Toronto.
James, L. E.	St. Thomas.
Jarvis, T. D.	Grimsby East.
Johnson, G. S.	Whitby.
Kilman, A. H.	Ridgeway.
Kitto, V.	Ottawa.
Logier, S.	Toronto.
Macnamara, C.	Arnprior.
McKechnie, J. B.	Toronto.
McCready, Prof. S. B.	Guelph.
Morris, F. J. A.	Peterborough.
Morse, A. E. W.	Grimsby.
Nash, C. W.	Toronto.
Noble, J. W.	Essex.
Petch, C. E.	Ottawa.
Prewett, F. J.	Toronto.
Ross, W. A.	Vineland.
Russell, J. M.	Woodstock.
Sanders, G. E.	Ottawa.
Saxby, J. W.	Toronto.
Sladen, F. W. L.	Ottawa.
Smith, Arthur	Toronto.
Snazelle, C.	“
Snazelle, Chas.	Thornloe.
Spencer, G. J.	Guelph.
Strickland, E. H.	Ottawa.
Thompson, W. R.	London.
Tothill, J. D.	Ottawa.
Walker, Prof. E. M.	Toronto.
Watson, Dr. A. H. R.	Port Hope.
White, James	Snelgrove.
Williams, J. B.	Toronto.
Wood, S. T.	“
Wright, W. H.	Guelph.

QUEBEC.

Barwick, E. C.	Montreal.
Beaulne, J. J.	Ottawa.
Brainerd, Dwight	Montreal.
Burgess, Dr. T. J. W.	Verdun.
Chapais, J. C.	St. Denis.
Chagnon, G.	Montreal.
Clayson, G. H.	“
Corcoran, J. A.	“
Davis, M. W.	Westmount.
Dunlop, G. C.	Montreal.
Du Porte, E. M.	Macdonald College.
Germain, Bro.	Three Rivers.
Griffin, A.	Montreal.
Gooderham, C. B.	Macdonald College.
Huard, Rev. V. A.	Quebec.
Leopold, Rev. Father	La Trappe.
Letourneau, F.	Oka.
Lochhead, Prof. W.	Macdonald College.
Moore, G. A.	Montreal.
Simms, H. M.	“
Southee, G. A.	“
Winn, A. F.	Westmount.

ALBERTA.

Baird, Thomas	High River.
Bentley, Lettice	Lethbridge.
Carr, F. S.	Edmonton.
Dod, F. H. Wolley	Midnapore.
Mackie, Donald	Edmonton.
Moodie, Miss	Calgary.
Whitehouse, F. C.	Red Deer.

MANITOBA.

Criddle, Norman	Treesbank.
Hippesley, Mrs. W. W.	Winnipegosis.
Hunter, Dr. A. J.	Teulon.
Wallis, J. B.	Winnipeg.

NOVA SCOTIA.

Abbot, Winona	Forbes Point.
Allan, E. Chesley	Yarmouth.
Baird, W. W.	Nappan.
Brittain, Prof. W. H.	Truro.
Cann, E. Mabel	Yarmouth N.
Conrad, Ethel M.	Halifax.
Craig, I. C.	Amherst.
Creighton, G.	Halifax.
De Wolfe, L. A.	Truro.
Dickey, C. M.	Kentville.
Distant, Mary S.	Halifax.
Dustan, A. G.	Bridgetown.
Gilliatt, F. C.	Granville Centre.
Good, C. A.	Truro.
Goodwin, Alberta	Stewiacke.
Henrion, Miss C.	Halifax.
Jennison, Mary	Truro.
Lindsay, Harriet E.	“
MacPherson, Dr. Hugh	Antigonish.
McGregor, Anna	South River Lake.

NOVA SCOTIA.—*Continued.*

McKay, Dr. A. H.	Halifax.
Mitchell, Lillie J.	"
Moses, Agnes	Brooklyn.
Payne, H. G.	Granville Ferry.
Payne, S. H.	"
Perrin, Joseph	Halifax.
Sanders, G. E.	Bridgetown.
Scott, Prof. J. M.	Truro.
Shaw, Prof. P. J.	"
Shipton, J. W.	Moschelle.
Sinclair, Nellie	South River Lake.
Smith, M. Lois	Truro.
Spittall, J. P.	"
Trevoy, Nellie M.	Brighton.
Wetmore, Ralph	Yarmouth.
Whitehead, W. E.	Kentville.
Whitman, C. F. U.	Lawrencetown.
Williams, C. M.	Nappan.
Young, Ermina	Brighton.
Young, M. E.	Middleton.

SASKATCHEWAN.

Androchowicz, E.	Humboldt.
Hutchinson, H.	Starblanket.
Johnson, G. S.	Moose Jaw.
McCulloch, A. J.	Regina.
Neville, S. J.	Cottonwood.
Willing, Prof. T. N.	Saskatoon.

BRITISH COLUMBIA.

Abbs, A. W.	Vancouver.
Abriel, T.	Nakusp.
Anderson, E. M.	Victoria.
Anderson, J. R.	"
Bain, T. H.	N. Vancouver.
Banks, W. W.	Salmon Arm.
Bird, M. L.	Vancouver.
Blackmore, C. H.	Victoria.
Brand, James	Vancouver.
Brealey, A.	Hatzic.
Brett, W. F.	Armstrong.
Breun, L. A.	Victoria.
Bryant, T.	Ladysmith.
Brydon, J. M.	Victoria.
Bush, A. H.	Vancouver.
Chapman, C.	"
Cockle, J. W.	Kaslo.
Collins, H. W.	Grand Forks.
Cunningham, T.	Vancouver.
Currie, H. B.	Salmon Arm.
Davidson, J. T.	Vancouver.
Day, G. O.	Vancouver Island.
Evans, H. H.	Okanagan Centre.
French, P. E.	Salmon Arm.
Fulton, C.	Kelowna.
Fulton, G. H.	Port Haney.
Gavet, D.	Vancouver.
Gemmel, M.	Sechelt.
Getchell, F. H.	Vancouver.
Hadwen, Dr. S.	Agassiz.
Hanham, A. W.	Duncan's Station.
Hill, Tom	Vernon.
Hoy, B.	"
Hugh, W.	Victoria.
Hunt, E. C.	Creator.
Jackson, W.	Creston.
Kyte, R. J.	Notch Hill.
Leach, D. H.	Salmon Arm.
Lyne, W. H.	Vancouver.
Matheson, J. B.	Kelowna.
McCubbing, C.	Salmon Arm.
McKenzie, K.	Kelowna.
Middleton, M.	Nelson.
Mitchell, D.	Tappin.
Palmer, L. L.	Vernon.
Palmer, R. M.	S. Cowichan.
Parham, G. L.	Invermere.
Reed, E. Baynes	Victoria.
Robertson, W. H.	"
Robinson, E. H.	
Ross, A. H.	Nelson.
Rowland, A.	Vancouver.
Ruhman, M.	Vernon.
Russell, D.	Lavington.
Russel, M. W.	Kelowna.
Scott, W. E.	Victoria.
Skinner, E. M.	"
Taylor, L. E.	Kelowna.
Thornber, H.	Kamloops.
Tomlinson, A. H.	Prince Rupert
Treherne, R. C.	Agassiz.
Venables, E. P.	Vernon.
Ward, W. E.	Vancouver.
Whiting, H. H.	Rock Creek.
Wilkerson, G. E.	Victoria.
Wilson, Tom	Vancouver.
Winslow, R. M.	Victoria.
White, E. W.	Sardis.

HONORARY MEMBERS

Cockerell, Prof. T. D. A.	Boulder, Col.
Comstock, Prof. J. H.	Ithaca, N.Y.
Cresson, Ezra T.	Philadelphia, Pa.
Felt, Dr. E. P.	Albany, N.Y.
Howard, Dr. L. O.	Washington, D.C.
Webster, Prof. F. M.	"
Wickham, Prof. H. F.	Iowa City, Ia.

LIFE MEMBERS

Bethune, Rev. C. J. S. Professor of Entomology, Ontario Agricultural College.	Guelph.
Fyles, Rev. Dr. T. W.	Ottawa.
Reed, E. Baynes Director of the Meteorological Station.	Victoria.

The Entomological Society of Ontario

ANNUAL MEETING

The Fifty-second Annual Meeting of the Entomological Society of Ontario was held at Ottawa on Thursday and Friday, November 4th and 5th, 1915. The President of the Society, Dr. C. Gordon Hewitt, occupied the chair. Among the members present were: Dr. H. T. Fernald, Amherst, Mass.; Mr. A. F. Burgess, Melrose Highlands, Mass.; Professor C. P. Lounsbury, Pretoria, South Africa; Dr. Hugh Glasgow, Geneva, N.Y.; Rev. T. W. Fyles, Ottawa; Dr. C. G. Hewitt and Messrs. Arthur Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. R. C. Treherne, G. E. Sanders, J. D. Tothill, E. H. Strickland, N. Criddle, G. Beaulieu, W. A. Ross, J. R. Gareau, C. E. Petch, R. N. Chrystal, and L. S. McLaine, Field Officers of the Entomological Branch; Prof. L. Caesar, Prof. E. J. Zavitz, and A. W. Baker, of Guelph; Prof. W. Lochhead, E. M. Duporte and T. Rankin, of Macdonald College; Prof. W. H. Brittain, Agricultural College, Truro, N.S.; Tom Wilson, Vancouver, B.C.; F. J. A. Morris, Port Hope, Ont.; A. F. Winn, Montreal; J. C. Chapais, St. Denis-en-bas, Que.; H. G. Payne, Kentville, N.S.; H. G. Crawford, Wilton Grove, Ont.; Rev. Father Leopold and Professor Letourneau, of La Trappe, Que.; Chas. MacNamara, Arnprior, Ont.; and Sir James Grant, Prof. E. E. Prince, Dr. T. Torrance, Dr. C. H. Higgins, Dr. F. T. Shutt, W. T. Macoun, R. H. Campbell, H. T. Gussow, W. Ide, D. Johnson, F. W. L. Sladen, V. Kitto, A. E. Kellett and J. I. Beaulne, Ottawa.

THURSDAY, NOVEMBER 4TH—MORNING SESSION.

The President: In opening our general session, I should like to welcome you all to Ottawa. This is an unusual meeting for a number of reasons. It is not the first meeting we have had in Ottawa—but it is an unusual meeting in that we have here for the first time all the officers of the Entomological Branch. Secondly, it is an unusual meeting as we have with us, and are honored by the presence of, Mr. C. P. Lounsbury, the Government Entomologist for the Union of South Africa. The surpreme nature of his visit prevented the appearance of his name on the programme, but that will not release him from taking part in our deliberations. He will probably have something to say later on. I, as President, did not prepare anything in the nature of an address for this meeting as we have a rather long programme. In the course of the proceedings I shall probably have a little to say regarding the progress of our work and of entomology in Canada generally. We have a certain amount of business to complete before our real session begins and I will now call upon the Secretary to read the Report of the Council.

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for the year 1914-15.

The Fifty-first Annual Meeting of the Society was held in Toronto on Thursday and Friday, November 5th and 6th, 1914. The meeting of the Council was held in the Biological Building of the University of Toronto, and the general meetings were held at the Royal Canadian Institute. The President, Dr. C. Gordon Hewitt, occupied the chair during the sessions.

The annual meeting of the Council was held on Thursday morning. Numerous business matters were discussed and a recommendation was made to the Society that the next annual meeting be held in Ottawa.

On Thursday afternoon the Reports of the Directors on the insects of the year were read. Dr. Hewitt then delivered the Presidential address on "The Rise and Progress of Applied Entomology in Canada." Prof. Caesar then delivered a paper on the "Insects of the Season in Ontario."

On Thursday evening in the Biological Lecture-room of the University Prof. J. H. Comstock, of Cornell University, delivered the Public Lecture on the "Habits of Spiders." The lecture was extremely interesting and was extensively illustrated with magnificent lantern slides.

The business meeting of the Society was held on Friday morning at 9.30. The reports of the various officers and branches of the Society were read and adopted. The remaining time of the morning and afternoon meetings was occupied with the reading of the following papers:

"The Work of Fabre," Prof. Lochhead, Macdonald College, Que.

"Injurious Insects of Quebec in 1914," Prof. Lochhead. (Read by title.)

"Injurious Insects of Southern Quebec," Mr. C. E. Petch, Ottawa. (Read by title.)

"Outbreak of the Army-worm in Canada in 1914," Mr. Arthur Gibson, Ottawa.

"The Army-worm in Ontario in 1914," Mr. A. W. Baker, Guelph.

"Mountains and Hills," Dr. Fyles, Ottawa.

"Variation in colour in the bristles of the Hedgehog Caterpillar, Isia isabella," Mr. Arthur Gibson, Ottawa.

"Locust Control in Eastern Canada," Mr. Arthur Gibson, Ottawa.

"An Imported Red Spider attacking fruit-trees," Prof. Caesar, Guelph.

"The Entomological Record, 1914," Mr. Arthur Gibson, Ottawa.

"Forest and Shade-tree Insects of the Farm," Mr. J. M. Swaine, Ottawa.

"Cherry Fruit-flies," Prof. L. Caesar, Guelph.

The Canadian Entomologist, the official organ of the Society, has been published regularly each month. The forty-sixth volume of the magazine was completed in December, 1914. It consisted of 446 pages and was extensively illustrated. This is the largest volume to date.

The Annual Report of the Society contained the proceedings of the annual meeting and formed a valuable edition to our entomological literature.

The regular meetings of the Society were reduced in number owing to military activities at the Ontario Agricultural College. The meetings were chiefly of a business character, but during the year the following papers were read:

"Some interesting points in the Army-worm Outbreak of 1914," Mr. A. W. Baker.

"The Study of Entomology," Prof. L. Caesar.

"Laboratory Methods in Collecting, Preserving and Dissecting Insects," Mr. G. J. Spencer.

The records show that twenty-four new members have been added to the rolls of the Society during 1914-15. The reports of the branches of the Society for 1913-14 all showed a successful year. It is with much pleasure that the Council records the formation, due largely to the efforts of Prof. W. H. Brittain, of a large and flourishing branch of the Society in Nova Scotia.

REPORT OF THE CURATOR.

The collections of the Society have been examined from time to time during the past year and kept free from museum pests.

With a view to supplying in a small way the sad need of Diptera, Hemiptera and Hymenoptera, special collections were made this summer and, as soon as the material can be identified and labelled, it will be added to the collections.

Contributions of these orders to the Society collections from members will be greatly appreciated.

G. Spencer, *Curator.*

REPORT OF THE LIBRARIAN.

During the year ending October 31st, 1915, seventeen bound volumes have been added to the library, making the number on the register 2,220. A large number of unbound pamphlets, bulletins, reports and periodicals have been received from authors and publishers and in exchange for *The Canadian Entomologist.* No binding has been done during the past year.

Among recent additions to the library may be mentioned the following: Packard's "Monograph of the Bombycine Moths of North America, Part 3"; Sir G. Hampson's "Catalogue of the Lepidoptera Phalænæ in the British Museum," Vol. 13 and supplementary vol. 1; Fletcher's "Some Indian Insects"; Slingerland and Crosby's "Manual of Fruit Insects"; Pierce's "Genitalia of British Geometridæ."

Reference to the library is constantly being made by the staff and students of the Biological Departments of the Ontario Agricultural College, and books are from time to time taken out by members of the Society at a distance.

Respectfully submitted,

Charles J. S. Bethune, *Librarian.*

REPORTS ON INSECTS OF THE YEAR.

Division No 1, Ottawa District—Arthur Gibson, Entomological Branch, Ottawa.

Attacking Field Crops.

Locusts. These insects were again very abundant in eastern Ontario. The young locusts began to appear towards the end of May, but owing to dull, cool weather conditions did not become active until the first and second weeks of June. The Lesser Migratory Locust (*Melanoplus atlanis*) was the chief destructive species. It was accompanied in noticeable numbers by the Pellucid Locust (*Camnula pellucida*). These two species are frequently found working together. Near Bowesville, Ont., where we continued our work on control with poisoned baits, the insects were present in countless thousands. The crops attacked were chiefly oats, barley, timothy, buckwheat, clover, tobacco, potatoes, and corn. In one instance near Ottawa about 6,000 celery plants were destroyed. On page 156 will be found a brief account of our 1915 work with poisoned baits.

CUTWORMS. The two species which in 1915 effected most damage in the Ottawa district are the Common Striped Cutworm (*Euxoa tessellata*), and the Dark-sided Cutworm (*Euxoa messoria*), both of which were very abundant the previous season. Vegetable and flowering garden plants were freely attacked. The former was the chief culprit and destroyed first sowings of beets, carrots, onions, etc. To a lesser extent the Red-backed Cutworm (*Euxoa ochrogaster*) was also present, being reported specially by vegetable growers. The Kansas grasshopper formula (Bran 20 lbs., Paris green 1 lb., molasses 2 quarts, oranges or lemons 3, water 2½ gallons*) this year gave excellent results at Ottawa for the control of cutworms. In one large field of onions the outbreak was stopped immediately. When scattered thinly the 20 lbs. may be used to treat about 3 acres, the application to be made after sundown. In one field of corn cutworms were plentiful and an application of the above mixture was made. Further injury was thus prevented and an examination made around 40 hills by Mr. Bryce, of Macdonald College, resulting in the finding of from 1 to 6 dead cutworms near each hill.

ROOT MAGGOTS. The three species, viz., THE CABBAGE MAGGOT (*Phorbia brassicæ*), the IMPORTED ONION MAGGOT (*Hylemyia antiqua*), and the SEED-CORN MAGGOT (*Phorbia fusciceps*), were all present in the Ottawa district in 1915, the two former causing much loss. The latter was reported attacking beans in small gardens. The Cabbage Maggot was particularly destructive to cauliflowers, cabbages, turnips and radishes. One market gardener near Ottawa reported the loss of 3,500 early cauliflowers. In continuing our work on the control of this insect we again demonstrated the value of the one-ply tarred felt paper disc. In one experiment about 1,600 plants had the discs placed around their stems and practically the whole crop was protected from maggot attack. The control of these root maggots is discussed in full in a bulletin which we have just prepared and which we hope will be available for distribution in the spring of 1916.

THE ASPARAGUS BEETLES. In September 1906, we found at Ottawa the larvæ of the COMMON ASPARAGUS BEETLE (*Crioceris asparagi* L.). Until 1915, this was the only record we had for the district. During the past season, however, the insect was abundant and destructive, and it was accompanied by the TWELVE-SPOTTED ASPARAGUS BEETLE (*Crioceris 12-punctata* L.). The year 1915 is the first in which we have found this latter species at Ottawa. The adult beetles were commonly found in the latter half of August. The larvæ of the latter species were collected from the seeds of asparagus on September 23rd. Growers of asparagus in the Ottawa district should watch for the appearance of these beetles in spring and apply the well known remedies.

THE ASH-GRAY BLISTER BEETLE (*Macrobasis unicolor* Kirby). Large numbers of this insect were observed in eastern Canada, near Ottawa, and also in parts of Quebec Province, where locusts had been destructive. In one field of potatoes which I examined in the latter half of June the beetle was present in thousands and the vines were conspicuously defoliated. At Bowesville. near Ottawa, Mr. T. Rankin found the insect abundant in early July. In addition to potatoes this blister beetle attacks beans, peas, beets, tomato, clover, etc.

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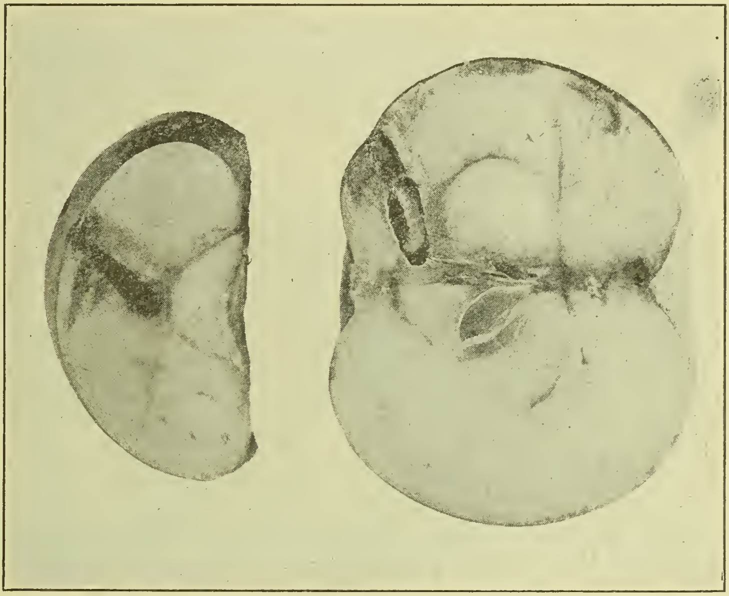
*In preparing the bran mash the bran and Paris green are mixed thoroughly while dry. The juice of the oranges or lemons is squeezed into the water, and to this is also added the pulp and peel after cutting into fine bits. The molasses should then be added, and when dissolved the mixture should be poured on to the dry bran and poison, stirring the whole constantly so as to dampen the bran thoroughly.

THE RED-HEADED FLEA BEETLE (*Systena frontalis*). In the middle of August this common black flea-beetle was seen at Ottawa to be attacking potatoes, and in flower gardens asters and chrysanthemums were injured. It was also found on carrot. It may be easily recognized by the conspicuous red patch on the top of the head; in length it is about three-sixteenths of an inch. Potato vines which are properly sprayed to protect them from the Colorado Potato Beetle would, of course, also be protected from the ravages of the Red-headed Flea Beetle.

PEA APHIS (*Macrosiphum pisi*). In eastern Ontario a rather serious outbreak of the pea aphis occurred, and from a few places reports of injury by the CARROT RUST FLY (*Psila rosæ*) were received.



Illustrating larva of Dock Sawfly, *Ametastegia glabrata* (*Taxonus nigrisoma*) and its habit of boring into apples in autumn in which to hibernate. (Original.)

ATTACKING FRUIT TREES.

APHIDES. These insects were present in large numbers during the season, many enquiries being received particularly with regard to the species occurring on plum and apple.

THE OYSTER-SHELL SCALE (*Lepidosaphes ulmi* L.) was frequently reported, but few instances of noticeable damage by the Codling Moth (*Cydia pomonella*), came to my notice.

THE DOCK SAWFLY (*Ametastegia glabrata* Fallen). During 1915 this insect, which in Canadian literature was previously known as *Taxonus nigrisoma* Nort., was abundant throughout eastern Canada, and its well-known habit of boring into apples in autumn was complained of. The same injury was noticed at Ottawa. In 1902, Fletcher* first recorded such injury to apples in Ontario, which was also in that year observed at Ottawa. The larva, which is known as the Dock False-worm, usually feeds on plants of the Dock family. Its habit of boring into the soft flesh of apples in autumn to hibernate is shown in figure 1. In one apple examined in September last two larvæ were found. The holes where the larvæ had entered were conspicuous. Several apples were examined and, in one, three holes occurred close together. An examination of these indicated that the larva evidently has the habit of boring several holes before finally closing one up in which to pass the winter. In one case the cavity in the apple was five-eighths of an inch long by one-eighth of an inch wide. The end was closed up with the "chewings" made by the larva, no frass being present. In another instance the larva had entered to a distance of nine-sixteenths of an inch and in still another eleven-sixteenths of an inch. In every case the head of the larva was towards the skin or outside of the apple. The larva was one-half inch in length, dark green in colour, the sides and centre whitish green; head pale brown, darker brown at vertex, on either side a conspicuous dark brown spot. In the December, 1915, number of the Proceedings of the Entomological Society of Washington, Rohwer places the name we knew the insect by, viz., *Taxonus nigrisoma* Nort., as a synonym of the European species, *Ametastegia glabrata* (Fallen).

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*33rd Annual Report of the Ent. Soc. of Ontario.

GREENHOUSE AND GARDEN PLANTS.

Garden plants of many kinds suffered seriously from the attacks of plant lice, and in early spring newly set out annuals were cut off by cutworms, the Striped Cutworm being the most destructive of the species which occurred in 1915.

THE FOUR-LINED LEAF BUG (*Pœcilocapsus lineatus* Fab.) was abundant in the district, attacking freely such garden plants as asters, dahlias, etc.

THE RED-HEADED FLEA BEETLE (*Systena frontalis*). As already mentioned, this common flea-beetle was found this year in August attacking asters and chrysanthemums.

The most interesting greenhouse insect of the year at Ottawa was the occurrence of the CHRYSANTHEMUM MIDGE, (*Diarthronomyia hypogœa* H.Lw.) in one of the large houses. This insect had doubtless been recently introduced with the plants from the United States, where it has become recently established. The Ottawa occurrence is the only record we have of the midge in Canada. Dr. Felt,* the New York State Entomologist, in writing of the species in April, 1915, recommends the destruction of badly infested plants by burning. Where the leaves only show slight infestation many of these may be removed. Fumigation with hydrocyanic acid gas would, of course, destroy the midges but would have little or no effect on the larvæ, which work within the leaf tissues.

DIVISION NO. 3, TORONTO DISTRICT—A. COSENS.

So far as the writer is concerned, the Entomological season of 1915 opened April 7th with a trip to the Etobicoke, a small stream that enters Lake Ontario a few miles west of the city. The banks of this creek are still wooded in many places, and even yet the Indian significance of the name, "the place of the Alder," is peculiarly applicable. The locality was choice, but a delightfully warm sun and the lethargy incident to the first tramp of the year made energetic collecting almost an impossibility. This and the early date serve as an explanation of the confession that the only insects captured were specimens of *Aphodius femoralis* Say., many of which were on the wing.

The excessive rainfall and the low average temperature of the past summer do not appear to have reduced materially the production of the various forms of insect life. Some orders were relatively poorly represented in the early part of the season, but later on became normally abundant. With the exception of the Cabbage-butterfly, other species were not so common as usual, until about the end of August, when several forms began to appear in larger numbers. At Mt. Dennis, Oct. 11th, many specimens of Milbert's Tortoise-shell, *Vanessa milberti* Godart, were flitting about or resting upon the heads of the large purple aster, the flower and insect combination adding a pleasing touch of color to the otherwise rather sombre tints of the frost-touched vegetation. After about the middle of July the Baltimore, *Melitaea phaeton* Drury, was fairly plentiful. As a general rule, both of these species are comparatively rare in this district.

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*Jour. Econ. Ent., Vol. 8, 267.

The damage done this year by several injurious insects has been more pronounced than usual.

At the beginning of the season, the webs of the Tent caterpillars were frequently seen on the Choke Cherries and other native trees of the fence rows and thickets in the vicinity of the city. From complaints received from fruit growers, it would seem that this pest has lost none of its wonted energy, and is still an important issue from an economic standpoint.

The continuous wet weather is credited by many with the greatly increased activity of the Carrot Rust Fly, *Psila rosae.* A gardener of many years' experience, who had never noticed the pest before, had his crop completely ruined by its ravages. In some cases the larvae had so tunnelled the carrot that the entire cortex was destroyed; it was impossible to find a single plant that was not attacked. For the benefit of others who may have crops similarly affected, I take the liberty of quoting the directions, kindly sent by Mr. Gibson, for bringing the insect under control. "Protection against the attack of the insect may be obtained, early in the season, at the time the plants are thinned out, by spraying with the ordinary kerosene emulsion, diluted one part in nine of water. Where carrots are stored in sand for winter use, the larvae leave the roots and pupate in the soil. In spring, of course, such sand in which the puparia occur should be removed and buried in a deep hole or thrown into a pond. It is wise to use land next year in which the carrots were not grown during the present season."

Sawfly larvæ were received from Mr. Blakely, of the Parks Department, who reported that they were damaging the California poplars in the eastern part of the city. Several trees were attacked by them, and the leaves badly eaten. These larvæ have a ground colour of yellow, broken by two pairs of lateral rows of black spots. In the upper series, these are irregularly circular in outline; in the lower, while of nearly the same shape, they are much smaller. The vertex of the head is black, shading to a deep brown at the front and sides. All the mouth-parts are yellow, with the exception of the mandibles, which are black. A black spot covers the dorsal portion of the last segment. The whole body bears a covering of long light-yellow hairs. The larvæ are gregarious feeders. Mr. S. A. Rohwer, Washington, to whom specimens were sent, writing under date of Sept. 27th, replied as follows:

"Yours of the 25th instant reached me this morning. The sawfly larvæ that you sent cocooned en route, but I do not doubt in the least that it is *Trichiocampus viminalis* (Fallen), a species that is treated under the name of *Aulacomerus lutescens* by Lintner in the fourth report of the State Entomologist of New York, pages 44-46. As far as I am aware, this is the first report of this species being of economic importance. The larvæ cocoon in the leaves, or the cocoon is attached along the trunk of the tree. Lintner found two generations, and this is probably the last. The best control measures to be adopted would be the raking up and burning of the leaves."

The Lesser Bud-moth, *Recurvaria nanella*. Larvæ of this Europeon species were found in numbers at Toronto, on a pear tree; and an apple tree in an adjoining lot had all the leaves rolled up by the larvæ. The species was determined by Mr. August Busck. The insect is discussed at length in Bull. 113 of the United States Department of Agriculture.

A large percentage of the grasshoppers, examined during September, were found to be parasitized by "hair snakes" of either the genus *Gordius* or *Mermis,* the latter being more numerous. The Red-legged Grasshopper, *Melanoplus femur-rubrum* De G., was the favorite host in this district. It would seem a reasonable conjecture that the wet season has had, in this case, a deterring effect on the production of the grasshoppers by furnishing more suitable conditions for the development of this parasite, but the dexterity with which the infected specimens evaded a net has given me grave cause to doubt the efficiency of this check. At least it seemed impossible to distinguish parasitized from unparasitized forms by any lessened activity on the part of the former.

Throughout July, the unusually wet weather must have produced ideal conditions for the maturing of aphids, as these insects were forced upon the attention at all times. Many different species of plants were infested, the spiraeas and roses of the city gardens were often seriously injured by them, and even the burdocks and lamb's quarters, of the vacant lots, were not immume from their attacks. Masses of a small black species surrounded the stems and leaf petioles of the common nasturtium, in many cases killing the smaller plants. Another variety established colonies on the flower clusters of the honeysuckles, and destroyed the majority of the unopened buds. Especially in the case of infected roses, a number of different remedies were applied. Some growers apparently had implicit faith in the effectiveness of an "absent" treatment, and did nothing at all, to the detriment of their own and their neighbor's plants. Others were firmly convinced that spraying with cold water was all that was necessary, while a few substituted a solution of nicotine. This last method appeared to give universal satisfaction wherever it had been properly tried. One gardener did, however, assure me that his bushes had developed a particularly hardy variety of aphid that refused to succumb even to the nicotine application.

A very interesting root gall was collected early in the spring by Prof. J. H. Faull, University of Toronto. The galls, which are produced on the roots of the False Solomon's Seal, *Maianthemum canadense,* Desf., consist of elongated swellings, from 8-12 mm. in length, and 2-3 mm. in diameter. They are circular in cross-section, and fairly regular in shape, tapering gradually at each end to the size of the normal rootlet. As the specimens were immature when secured, it was necessary to keep them under moist conditions for several weeks. This may account for the fact that only four producers were secured from a dozen galls. The insects were sent to Dr. E. P. Felt, Albany, N. Y., who has pronounced them a new species, and is describing them under the name *Dasyneura torontoensis.* The only information that we possess, concerning the life histories of the adults, is that they emerge late in June. The light color of the insects would seem to indicate that the greater part of their existence is spent underground.

DIVISION NO. 5, PORT HOPE DISTRICT—FRANCIS J. A. MORRIS.

An active collector of Lepidoptera in Port Hope, Mr. H. L. Bowers, has now moved to Oshawa and reports an unprofitable season's work due to bad weather and unfamiliarity with his surroundings. He writes:

> I collected pretty steadily until June 15th, but took few specimens, Oshawa being a poorer hunting ground than Port Hope. Extreme wet seemed to keep insect pests in the background. "*Pieris rapae*," owing to spread of wild mustard, seems on the increase; in September the fields were white with them; milkweed butterflies were more numerous than last year; other butterflies were scarce; such scarcity has been remarkable the last two or three seasons. During 1912 I could have taken hundreds of *Vanessa J-album*, but have seen few since. Tent caterpillars, both American and forest, were more numerous this year than last. Many orchards around Oshawa were completely defoliated. I was interested to see how much these were parasitized, and out of 100 cocoons, I did not find one thus suffering. Pistol case-bearer of the apple was very plentiful. I noticed many apple trees badly infested with aphids. The tendency to allow wild apple, cherry and plum to grow unchecked has a great tendency to render means taken by progressive orchard-men to keep down insect pests, largely abortive. Practically all of the wild apple trees that I have seen around Oshawa have been heavily infested with the Oyster-shell scale. In September, I saw many cherry trees near Newtonville badly eaten by pear-tree slug (*Selandria cerasi*). The caterpillars of certain species of *Crambus* were very numerous in meadows. I noticed the maple trees in Oshawa badly infested with Pigeon Horn Tail, which oviposited continuously from August 3rd to September 15th; *Thalessa lunator* was also plentiful. Hemlocks on the main street were badly infested with *Tortrix funiferana*. Some horse-chestnuts were badly eaten by tussock caterpillars. The Promethea moth, found very scarce at Port Hope (one cocoon in six years), seems plentiful here. I took *Phigalia titea*, April 13th; *Orthofidonia vestaliata* were plentiful for several weeks; *Drepana arcuata*, May 30th; *Sphinx cerisyi*, June 13th; *Thecla liparops*, July 18th. I have identified some of the captures made last year, and the following is a list of those made at Port Hope, which have some interest. I believe they are all fairly scarce:—
>
> *Sphinx cerisyi.*
> *Diphthera fallax.*
> *Hyperaeschra georgica.*
> *Fentonia marthesia.*
> *Galgula hepara.*
> *Catocala innubens.*
> *Catocala vidua.*
> *Raphia pater.*
> *Semiophora opacifrons.*
> *Semiophora tenebrifera.*
> *Hydriomena ruberata (birivata?).*
> *Thecla edwardsii.*

Dr. Watson of Port Hope reports the cutworm locally troublesome on cabbage and cauliflower.

Mr. Duncan, of the Department of Agriculture in Port Hope, says the Potato Beetle was very prevalent and that he noticed in several places the Friendly Perillus at work destroying the larvæ. Aphids were not so abundant. He was called to look at an apple orchard near Orono that was overrun by Tent caterpillars. It was ten or twelve acres in extent, and most of the trees were denuded of foliage and bore no fruit, except in the one corner that he was able to save by spraying with arsenate of lead. Some idea of the numbers of these creatures could be gathered from a sack that he saw slung over a branch in the orchard: *ex pede Herculem*—in the folds of the sack he counted over fifty cocoons. His recollection is that both species of caterpillar were equally numerous. The orchard was a well-kept one and had not been attacked in 1914. This, again, points in the same direction as Mr. Bowers' note. There were doubtless rich breeding grounds along some nearby fences the year before, or even that same season, but the larvæ ran out of food and like many another young innocent crept into the apple orchard. The canker worm was also prevalent in the orchard.

The school collections of insects, Mr. Duncan says, were up to average and a few collections were extensive and well arranged. In the Peterborough Collegiate 30 or 40 of these come in annually and I often find specimens of great interest among them. This year the families of American Silk-worm moths and of Sphingidæ were remarkably well represented. Among the latter was a very beautiful specimen of the Nessus (*Amphion nessus*).

For the amateur collector the summer of 1915 was far from favourable. The bright days of May and June were nearly all marred by cold winds. This kept the sun-loving species inactive, and made your director's favourite field of collecting comparatively barren. This feature was specially noticeable in the second week of June and again after a spell of wet weather at the end of June. The early mornings were bright and promised well, but by noon quite a chill wind from the east had sprung up and the results of several all-day tramps were on the whole disappointing. In two years' residence in Peterborough it has been impossible for me to collect through the month of July, owing to work in Toronto. Next season this work will probably not be incumbent, and I have great hopes of watching more closely the insect visitors to blossoms during June and July in my new neighborhood. So far my observations have been chiefly confined to bark, sap, fungus and foliage.

Very early in May the tent caterpillars again made their appearance about Peterborough in large numbers. The city authorities set apart a small sum of money and had some men go round the residential streets within the limits, cutting off infected limbs and destroying some of the apple trees and wild plums on waste grounds and in hedges where the pest abounded. This work seemed fairly effective in saving shade trees about the city, but it did not strike at the root of the evil as Mr. Bowers points out. I had the curiosity one day to count the webs (very populous webs) beyond the limits on a stretch of lane about equal in length to two blocks of city street. They numbered over 100; choke-cherry, pin-cherry, wild plum, apple, and hawthorn, all affording food and shelter to myriads of both the forest and the apple tent caterpillar.

Early in May I paid a visit to the alder swamp between Peterborough and Best's where the varieties of Chrysomela reported last season had been found. These were all present once more, the differences from normal being apparently quite constant. In the middle of May where some cedar groves had been chopped down, I took several specimens of *Callidium aereum* on a cedar trunk. At the end of May I captured some interesting beetles in hawthorn blossom; these included *Cyrtophorus verrucosus, Molorchus bimaculatus, Callimoxys sanguinolentus, Acmæops proteus, Leptura capitata,* and *L. sex-maculata; Orsodachna atra;* and *Malachius æneus.* This last was new to me, though a single specimen was taken near Port Hope this year by Dr. Watson. It is very abundant in the neighborhood of Peterborough. The collection made by pupils at our collegiate, I notice, are rarely without it. Last season I saw fifteen or twenty at the end of June on the blossoming heads of meadow grass; and this season I captured over a hundred from a single hawthorn on Aylmer Street without apparently reducing the number of guests at the banquet. This beetle is interesting to the systematist. It is described by Le Conte and Horn as introduced from the West coast and is, moreover, *sui generis* in Eastern America. The family occupies a space between the Lampyridæ and the Cleridæ. I think the only other member of the family known to me is a *Collops,* a very pretty little beetle (also frequenting blossoms) that I have captured occasionally—once at Guelph, when I was out with Mr. Caesar.

In the first week of June at Jubilee Point on the north shore of Rice Lake I captured two specimens of an Agrilus, steel-blue, with white marginal marks on the metasternum and abdomen, feeding on hazel leaves; and on Spook Island where I paddled over in the hopes of locating a colony of *Chrysomela scalaris,* var. *pnirsa,* I discovered nearly all the foliage on the island fretted into holes by millions of *Brachys ovata* on oak, *ærosa* on basswood and grapevine. About the middle of the month I spent a day at Hastings, and saw for the first time immense numbers of the larvæ of the Jumping Sumach beetle (*Blepharida rhois*); they were feeding on the fragrant or Canada Sumach. This shrub I have seen in three places only, on the north shore of the upper Rideau, in August, where the imago of this beetle was abundant; on the cliffs below the Whirlpool Rapids, Niagara, where no trace of either larva or imago could be seen; and here at last, June, 1915, where hibernated imagoes were occasional and larvæ in great abundance. The larva is one of the most disgusting sights in the insect world. It is covered with what appears to be liquid excrementitious matter. This is smeared so thickly over its surface as to give it a deformed lumpy appearance. The insect glistens with this slime much as the larva of the saw-fly, known as the Pear-tree Slug. Though the sumach grows, a low and upright shrub, in open pastures, and the insect feeds in broad daylight, exposed on the upper surface of the leaves, yet the fiercest rays of noontide sun seem to have no effect on its slimy coat; it neither evaporates nor cakes. Without imputing a fairly high aesthetic sense to insectivorous birds, we must suppose this creature to be just about as savoury a morsel as it looks; the soft, helpless, sluggish infant of a larva is just as immune as the hard-shelled, leaping and flying beetle.

On June 13th I captured a newly emerged specimen of the Elder-borer, *Desmocerus palliatus,* south-east of Peterborough. This is the earliest record I have made for the insect in our latitude; they became abundant in the last week of June. About the 10th of July I captured six in Niagara Glen and as late as the first week of August one in the neighborhood of Owen Sound. About the middle of June in some felled and decayed elms lying on the edge of a poplar swamp I found breeding several specimens of *Physocnemum brevilineum.* These were settling in the sunshine on the prostrate trunks, or sheltering from the east wind in crevices and under loose flakes of bark. It was there and then that I found the first specimen of the Elm Saperda (*Saperda tridentata*) I have ever taken on its food tree. As the net result of two visits to this collecting ground I will list the more interesting captures made:

Physocnemum brevilineum (elm)	25
Saperda tridentata (elm)	14
***Tetropium cinnamopterum* (white pine)	1
***Hoplosia nubila* (basswood)	1
Callidium antennatum (cedar)	1
Pachyta monticola (thimble-berry blossom)	6
Leptura proxima (thimble-berry blossom)	2
***L. chrysocoma* (thimble-berry blossom)	1
L. 6-*maculata* (thimble-berry blossom)	1
Rhagium lineatum (hemlock trunk)	1
Clerus thoracicus var. *rufiventris*	19
(wood piles)	abundant
Melanophila fulvoguttata (newly felled hemlock)	abundant
Anthaxia æneogaster (fleabane blossoms in hemlock swamp)	abundant
Xenorhipis brendeli (basswood stumps)	abundant

Besides these, seven or eight other species of Leptura were noted and ten other genera of cerambycid. In the latter part of June, larvæ, pupæ, and imagines of the very handsome Ladybird (*Anatis 15-punctata*) were found in great numbers on leaves of elder, ash, butternut, basswood and maple. About one-fifth of these were of the normal form, the rest were of the variety *mali,* in which the elytral spots are "eyed" with a narrow halo paler than the ground color. This mention of varieties recalls a point of interest in connection with an insect taken in 1914, but not identified by me till after our last meeting. The insect is the Staphylinid *Oxyporus,* but as my report is a long one I will omit the note, as I have done with similar notes on *Hoplosia nubila* and *Pogonochœrus mixtus.* The note is mainly of systematic interest.

At the end of June I went down to Port Hope a few days before reporting for duty in Toronto. While there I visited a hardwood four miles north of the town, where axe and saw had been busy in the winter. Again I will save space by listing the more interesting captures made:

Neoclytus erythrocephalus (dead twigs of hawthorn and maple)	3
Arrhopalus fulminans (under bark, stump of butternut)	1
**Calloides nobilis* (under chip of oak)	1
**Centrodera decolorata* (maple stump)	1
Elaphidion villosum (oak stump)	1
**Pogonochœrus mixtus* (pine trunk)	1
**Goes oculatus* (willow foliage)	1

The last beetle in this list was captured on the old home farm of Mr. John Hume. There is a swamp here just below a high ridge of land to the north, and where the willows are thick two streams flow out from the swamp, one about the size of a field drain, the other rather larger; the smaller flows south-east, the larger south-west. In the willows here I noticed a number of wasps flying to the stems. The stems proved to be covered with recent bore-holes, from which was exuding dark pulp. It was evidently the pungent smell of fermenting sap that had brought the wasps, and while I was investigating, several butterflies hovered or settled about the bores and two beetles (*Gaurotes cyanipennis*) were taken feeding at them. Presently I discovered a pair of weevils, with a large white patch near the apex of the elytra, resting on a stem a foot or two above the bores. It was *Cryptorhyncus lapathi* (as I have since learned from Mr. Caesar). I was unable to see any insect emerge from the tunnels, nor did I notice any ovipositing. Soon after, Dr. Watson came out with me and we captured over 20 of these curculios. Next day I had to go to Toronto as an associate examiner. This was about the 3rd of July. Dr. Watson visited the place about four times in the next five weeks and never failed to find several of these creatures on the willow. At Thanksgiving I visited the same place and also followed the larger stream for half a mile south-west. No insects were to be found on the trees, and though I took some infested stems home with me, I could find no trace of eggs. There were several larvæ, but I could not identify them for certain. One looked like the larva of *Saperda concolor.* The willow worst-bored appeared to be *Salix discolor.* Trees of *Salix nigra* seemed immune and also those of a species I could not identify—the leaves broad and not very long, rugose with veins on the upper side and downy beneath. The foliage was partly shrivelled in October and there seems to be much intergrading among the willows, which makes identification unsatisfactory except in the blossoming season. The boring was worst at the base and seldom extended further up than eight or nine feet. Stems less than 2½ inches in diameter were seldom, if ever, touched. Those of 5 inches in diameter seemed the favorite resort, and occasionally stems eight and nine inches in diameter were badly bored, but not trees of greater thickness than this. The damage was observed over more than a mile of country between south and north, and half a mile between east and west. In the west area the willows were riddled with holes, and trees that had five or six stems growing out from the roots had (nearly all) lost some of these, either snapped off above by the wind or broken down by their own weight at the base. More than once in crossing the stream I broke off a thick stem by simply bearing on it with my hand. On returning to Peterborough after Thanksgiving I went through twenty or thirty collections of insects made by pupils of the school, and in one located a single specimen of the beetle. So far I have not found any damage to willows in our neighborhood.

While I was in Toronto (between July 3 and July 24) Dr. Watson captured a large number of *Urographis fasciata* on a felled oak as well as on a neighboring woodpile of the same material. On the log he saw also, but failed to capture, some specimens of *Neoclytus erythrocephalus.* They are extremely quick in their movements, especially during hot sunshine. Two days snatched from the holocaust of July, I managed to spend at Queenston and made a number of interesting captures between there and Niagara Glen, mostly about blossoms of New Jersey Tea. I have a list of these but will not trespass further on your time and patience.

*_Toxotus cylindricollis_ (foliage of hazel)	1
Plagionotus speciosus (foliage)	1
Oberea bimaculata (raspberry)	1
**_Strangalia luteicornis_ (New Jersey Tea)	3
*_Leptura subhamata_ (New Jersey Tea, all male)	4
**_Leptura cordifera_ (New Jersey Tea)	6
**_Leptura_ (sp. ? _dehiscens_ New Jersey Tea)	2
Trichius, 2 species (flowers)	abundant
Macrobasis unicolor (vetch)	abundant
3 species of _Cryptocephalus_ (foliage)	abundant
Eupogonius subarmatus (basswood)	abundant

Early in August I took another specimen of *Eup. subarmatus,* always on basswood; and throughout August in the Algonquin Park found *Leptura canadensis* common—none of them males.

On returning to Peterborough in September, I found the climbing nasturtium on our verandah-railing badly infested with *larvæ* of *Pieris rapæ.* In a few minutes I picked about 100 off the leaves over a space of about six feet. On each of the two following days I gathered almost as many. I suspect they came from a vacant field, nearly opposite, in which charlock has been allowed to grow. They were succeeded in October by black aphids from a neighbor's dahlias. These multiplied so on a thick stem that had twined about the verandah post that it resembled a ship's mast coiled round with a spiral of tarred rope.

Division No. 7, Niagara District—William A. Ross.

As Mr. Caesar in his report on "Insects of the Season in Ontario" will no doubt refer to most of the common pests found in the Niagara district, I shall confine my attention to a few insects which were of special interest to me.

APPLE APHIDS. The three species, *Aphis sorbi, Aphis pomi,* and *Aphis avenæ,* were again abundant. Some young apple orchards were very heavily infested with *A. pomi,* but in bearing orchards *A. sorbi* was, as usual, the chief depredator.

In connection with the summer hosts of *A. sorbi* it was found that the migrant forms readily colonized three species of Plantago—*P. lanceolata, P. major* and *P. rugelii,* and that as many as eleven generations of the aphid may develop on these weeds. Both in the insectary and in the fields *P. lanceolata,* common rib grass, appeared to be the favorite host.

THE PEAR PSYLLA (*Psylla pyricola*). At the Vineland Experimental Farm gratifying results in the control of this insect were obtained. In one experiment infested trees were sprayed, after the cluster buds had burst, with lime sulphur wash, testing 1,030 specific gravity. In a second experiment, of course with different trees, lime sulphur diluted to summer strength in tobacco water (1 lb. tobacco refuse in 2 gallons of water) was used and the application was made just after the blossoms had fallen. The results given by these two treatments can best be stated by quoting from notes made on May 22nd: "Exp. No. 1. Results good—very few nymphs are present on the trees. Exp. No. 2. Results practically 100 per cent. effective—only one living nymph found. Check. Psyllas are numerous on unsprayed trees."

LESSER PEACH TREE BORER (*Aegeria pictipes*). Early in the season many complaints were received from fruit growers regarding a "worm" which bored into the trunk and large branches of peach trees and produced gumming. On looking into this matter it was found that in practically all cases the gumming was primarily caused not by the "worm" but by the peach tree canker fungus. The "worm," the lesser peach borer, was, however, very much in evidence in the cankered areas and by its work aggravated and greatly increased the wounds. I should mention here that I found the borer in all old cankers which I examined, and that I took as many as six larvæ from one injured area.

The adults of the lesser peach borer commenced to emerge towards the end of May and the maximum emergence appeared to take place during mid-July, judging by the large number of empty pupal skins found protruding from the trees at that time.

CHERRY APHIS (*Myzus cerasi*). Last spring there was a serious outbreak of this plant louse on sweet cherries in different parts of the Niagara district. In a Vineland orchard, which I had under observation, the young shoots were injured so severely that by the latter part of July most of the tender foliage was dead. The fruit in this same orchard was small, ripened irregularly and much of it was covered with honey dew and honey dew fungus. In fact so much damage was done to the fruit that most of the crop was left on the trees.

Mr. Howard Curran, my assistant, sprayed two infested trees with whale oil soap, 1 lb. to 4 gallons of water, and destroyed in the neighborhood of 99 per cent. of the aphids.

THE RASPBERRY BYTURUS (*Byturus unicolor*). This insect is rarely troublesome in Ontario. However, during May it was present in a large raspberry plantation near Jordan in sufficiently large numbers to give a great deal of anxiety to the grower. The beetle destroyed many of the flower buds by eating into them. It also fed on and skeletonized the tender foliage, especially the foliage near the flower buds.

The owner of the raspberry bushes sprayed them with arsenate of lead and apparently got good results, because when I visited his place later on I found comparatively few beetles on the bushes.

THE RASPBERRY SAWFLY (*Monophadnoides rubi*). This pest was very troublesome last year, but I regret to say it was much more destructive this season. Two large raspberry plantations near Vineland were very badly infested and on many of the bushes all that was left of the foliage was the petioles and leaf ribs.

The raspberry sawfly is readily controlled by spraying with arsenate of lead, but as the insect is not regularly injurious the fruit grower seldom thinks of applying the remedy until it is too late.

THE PRIVET PLANT LOUSE (*Rhopalosiphum ligustri*). This greenish-yellow aphid was again very abundant on privet and as a result of its depredations several beautiful hedges were partially defoliated.

Last year I referred to this insect with some doubt as the European species *Rhopalosiphum ligustri.* However, there is no longer any question in regard to its identity, as my determination was confirmed by Prof. Theobald, of London University, England, who kindly examined some specimens which were sent to him.

Before coming to this meeting I had occasion to examine an infested privet hedge, and I was greatly interested to find three kinds of males present, viz.: winged, wingless and forms intermediate between alate and apterous. This would seem to suggest that the male of *R. ligustri* is in an unstable condition and that it is gradually changing from the primitive to the specialized form, i.e., from alate to apterous.

THE ASPARAGUS BEETLE PARASITE (*Tetrastichus asparagi*). Early in June this interesting chalcid, heretofore unrecorded in Canada, was found destroying the eggs of the asparagus beetle (*Crioceris asparagi* L.) at Vineland Station.

Tetrastichus has a very curious life history. The female by means of a sharp ovipositor pierces the egg of the asparagus beetle and deposits within it her own eggs (from three to nine in number according to dissections which I made). In due course, the beetle egg, its viability unaffected, hatches, and the grub grows to maturity. The chalcid eggs in the meantime hatch and the parasites apparently nourish themselves on the body fluids of their host without appreciably interfering with its development. The full-grown asparagus grub enters the soil and forms the pupal cell, but proceeds no further because at this stage it is wholly consumed by the chalcid larvæ. The parasites then pupate within their host's cell and later emerge as adults.

The adult *Tetrastichus* is a voracious feeder on the eggs of the asparagus beetle and in this capacity the insect is really of greater economic importance than in the role of a parasite. In support of this statement I may mention that early in June asparagus beetles and their eggs were exceedingly abundant on the asparagus plants at the Vineland Experimental Farm, but the hungry chalcids destroyed so many eggs that very few grubs hatched out—less than one per cent., I should say. Later on when the parasites were not so plentiful a larger percentage of the beetle eggs hatched.

In feeding the chalcid stands on the egg, plunges her ovipositor into it, and energetically works the ovipositor up and down usually for three or four minutes. She then steps back, applies her mouth parts to the puncture and feeds on the egg contents. If the first prodding does not render sufficient food available the operation may be repeated. In fact I noticed one chalcid attack an egg no less than four times.

There are apparently two broods of this insect in the Niagara district. Adults of what I took to be the first generation were very abundant during early June, but by June 28th they had all disappeared. Second brood "flies" emerged late in July and were found on the asparagus plants until the latter part of August. This generation was much smaller in number than the first.

REPORT OF THE BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY.

MR. TREHERNE: As Secretary of the British Columbia Entomological Society, a branch of this Society, I may say that our membership stands at about seventy at the present time. About thirty of these can be considered active members, those that are engaged in recording insects from different parts of the province, and who are anxious to receive information of a more technical character, such as is recorded in *The Canadian Entomologist.* The remainder are mostly farmers and fruitgrowers of a better type who are interested in the control of insect pests. We have an interesting development that occurred during the past year in the formation of sub-branches, Victoria and Vancouver. The Vancouver sub-branch are holding monthly meetings during the winter, turning in their reports to what they call the parent Society, that is to say, the Entomological Society of British Columbia. The membership has been affected on account of the war, several of our men having gone overseas, and our Society has decided to continue their payments out of their own funds. We have published up to date seven bulletins during the past three and one-half years. At the present time many recent members, members that are not particularly interested in the Society, are dropping out, and the result is that with those that are members we are getting on a more level basis in that we have men that are more keenly interested in the Society, and I think that in a year or two the Entomological Society of Ontario will find a very active, strong Society in the West.

DR. HEWITT: The Society has listened with much interest to Mr. Treherne. We all know that the formation of the Branch out there is entirely due to Mr. Treherne's personal efforts and the support he has received from men like Mr. Wilson, who is with us to-day, Mr. Day, and others, and it is very satisfactory to think of the strong branch the Society has out there. We will now have the report of the Montreal Branch.

REPORT OF THE MONTREAL BRANCH.

The 42nd annual meeting of the Montreal Branch was held at 32 Springfield Ave., Westmount, on Saturday evening, May 15th, 1915.

The Secretary read the report of the Council as follows:

The Branch has held, during the season of 1914-15, nine monthly meetings, the average attendance being over six.

We record, with deep regret, the death of our late member Mr. Henry H. Lyman, who had been an active member since 1875, and had occupied all the executive offices of our Society at one time or another. By his will, his large and valuable collection of Lepidoptera and other insects, and his fine entomological library, are now housed in the Redpath Museum of McGill University. This is now being carefully put into order and when funds become available it should rapidly become one of the most important insect collections in Canada, and of great assistance to students of insect life. By the terms of Mr. Lyman's will the President and Secretary of this Branch are desired to be associated with the Professor of Zoology of McGill University, as members of a committee to manage the bequest.

The papers read at the meetings during the year were as follows:

1.	Annual Address of the President	A. F. Winn.
2.	Electrical Fuses Attacked by Larvæ of *Dermestes lardarius*	Geo. A. Moore.
3.	The American Tortoise Shell Butterfly, *Vanessa milberti* Godard	A. F. Winn.
4.	*Saldidae*, or Shore Bugs	Geo. A. Moore.
5.	Studies in the Genus *Phaeocyma*	G. Chagnon.
6.	The Geometrid Genus *Nyctobia* Hulst	A. F. Winn.
7.	The Coloration of Insects	A. F. Winn.
8.	The Coloration of Exotic Butterflies	G. C. Clayson.
9.	The Colors Seen in Hemiptera	Geo. A. Moore.
10.	Address on Annual Meeting	Prof. Lochhead.
11.	Illustrated Talk on "Work of Entomological Division	A. Gibson.
12.	Notes on the Cause of the Blue Coloration of the Blue Lycænids	H. M. Simms.
13.	Report of the Annual Meeting of the Quebec Society for the Protection of Plants	Geo. A. Moore.

Besides the regular papers read Mr. Winn exhibited the list of Quebec Diptera which had been compiled with the assistance of Mr. Beaulieu, and had been edited by Mr. Johnson of Boston.

Our January meeting was honored by a visit from Prof. Lochhead, of Macdonald College, with three students.

We also had a visit from Mr. Arthur Gibson, Assistant Dominion Entomologist, at our February meeting. He gave a lantern-illustrated talk upon the work being done at the different entomological laboratories in Canada.

At this latter meeting Mr. Simms illustrated the blue coloration of the Lycænids, by means of a spectroscope.

Our March meeting was made more interesting by a series of microscope slides being shown.

The report of the Treasurer showed a balance of $82.34 on hand.

Mr. H. M. Simms, one of our members, has enlisted for Overseas service in the great European war.

The following officers were elected for the ensuing year:

President	A. F. WINN.
Vice-President	G. CHAGNON.
Secretary-Treasurer	GEO. A. MOORE.
Librarian	G. CHAGNON.
Council	MESSRS. G. A. SOUTHEE, G. H. CLAYSON, E. C. BARWICK, H. M. SIMMS.

GEO. A. MOORE,

Sec.-Treas.

REPORT OF THE TORONTO BRANCH.

The nineteenth annual meeting of the Toronto Branch was held in the Biological Building on Thursday, October 14th, 1915, the chair being occupied by the President, Dr. Cosens.

The minutes of the previous meeting having been read and approved, the report of the Council and financial report were presented and adopted.

Eight regular meetings, not including the annual meeting, were held during the season 1914-15, at which the average attendance remained about the same as in past years.

The following list comprises the papers read during the season:

Oct. 9. "Insect Aliens, Desirable and Otherwise," illustrated with specimens. Dr. A. Cosens.
Nov. 19. "A Trip to Point Pelee." Mr. C. W. Nash, Provincial Biologist.
Dec. 10. "Crickets," illustrated by specimens. Dr. E. M. Walker.
Jan. 14. "Some Entomological Notes in North Dakota," illustrated by specimens. Mr. F. J. Prewett.
Feb. 10. "Two Months in New Brunswick," with lantern illustrations. Mr. E. Horne Craigie.
Mar. 25. "Types of Neuroptera," illustrated by specimens. Dr. A. Cosens.
April 29. "Blood-sucking Flies," with lantern illustrations. Dr. E. M. Walker.

At the meeting held May 20th, Dr. Walker exhibited a collection of beetles intended for the Royal Ontario Museum; Mr. Hanniball, a living horned toad from Texas, and Dr. Cosens, galls and producers of the genus Rhodites.

A successful field meeting was held at Mount Dennis on May 29th.

During the season four new members had been elected, two had gone to the front, and one had resigned.

The financial report showed a balance on hand of $13.90.

A paper was read by Dr. Cosens upon "The Founding of the Science of Cecidology," after which the election of officers for the coming season took place.

The election resulted as follows:

President .... DR. E. M. WALKER.
Vice-President .... E. HORNE CRAIGIE.
Secretary-Treasurer .... S. LOGIER, 1244 St. Clair Ave., Toronto.
Librarian .... H. E. BICKNELL.
Council .... DR. A. COSENS, C. A. SNAZELLE, C. W. NASH, J. HANNIBALL.

Respectfully submitted,

E. HORNE CRAIGIE,

Secretary.

THE NOVA SCOTIA BRANCH.

THE PRESIDENT: We are very pleased to learn, as announced in the report of the Council, of the formation in Nova Scotia of an Entomological Society, which has become affiliated as a branch of the Ontario Entomological Society, and I should like to take this opportunity of congratulating Prof. Brittain and his associates in the energetic way in which he has collected together the scattered units who have entomological leanings in that Province. We shall be glad to hear from Prof. Brittain, if he has not a formal report, a few words in regard to the Society.

PROF. BRITTAIN: Though I did not prepare any formal report, I am pleased to be able to say that in July last we held an organization meeting and succeeded in forming a very flourishing branch of the Ontario Entomological Society.

We were fortunate enough to have the support of Dr. A. H. MacKay, Superintendent of Education; Mr. L. A. DeWolfe, Director of Rural Education; several of the provincial school inspectors and others. All of these men have shown the deepest interest in the work of the Society, and with their help we have been able to enlist the support of a large number of teachers throughout the Province, many of whom have already done some collecting and otherwise shown an interest in entomological work.

I have also had the heartiest assistance and encouragement from Mr. George E. Sanders, Field Officer of the Dominion Entomological Branch. In all these, together with the inspectors and ex-inspectors of the Dominion and Provincial Entomological Branches, we have a very good nucleus for the establishment of a strong and vigorous society.

At the present time we have a paid-up membership of forty-one members, and I confidently hope and expect that before the winter has passed, we will have doubled that number.

The President: I am sure the members have listened to this extempore report with very great pleasure. It is a matter of regret that while there used to be a branch in the City of Quebec, we have not had a branch there for many years, at least as long as I have been in this country, although we now have in the Province of Quebec the Society for the Protection of Plants from Insect Pests and Plant Diseases, which, in a way, takes the place of a Provincial Entomological Society. At the same time, I think there is room for greater activity in the Province of Quebec in the matter of entomology. We have a faithful friend in Mr. Chapais, who, I think, should try and work up the interest of the Entomological Society in the Province of Quebec. Before proceeding further I should mention that letters of regret have been received from the following people on account of their inability to attend the meeting: Mr. Grodge Davidson, Provincial Botanist of British Columbia; The Rev. Abbé Huard, Provincial Entomologist of Quebec; Prof. J. M. Aldrich; Prof. G. A. Dean; Dr. W. E. Britton, State Entomologist of Connecticut; and then, in addition, we had promises to be present from the following members of the Society and gentlemen who intended to be present: Dr. Felt, but he has had an urgent call to Long Island; Dr. Walker, who has been unable to come on account of his academic duties, and Dr. Bethune, who was not able to make the trip and who had lectures to attend to. Dr. Howard was to give our public address, but he is unable to come owing to the fact that he met with an accident. We also should have had with us Prof. Willing, Assistant Professor of Natural History at the University of Saskatchewan, but illness has prevented him from coming.

REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

I have the honor of presenting the following report of the work of the Ontario Entomological Society for the year 1914-15.

The past year was a very successful one. The active membership continues to increase, and the Society has now a relatively large number of trained workers engaged in the investigation of the many insect problems that arise yearly in every province. The presence of these new members has a stimulating influence on the general work of the Society. They are young men, mostly graduates of the agricultural colleges, and filled with the enthusiasm of youth and eager to advance the interests of their profession. As a matter of fact the entomological interests of the Dominion are now, to a large extent, in their keeping.

Another feature of recent entomological work is the appearance of an increasing amount of investigation that might fairly be classed as high grade. This result may be attributed to the fact that our younger entomologists have the advantages of a scientific training and are thus able to undertake problems beyond the power of their predecessors.

Much of the credit for the vigorous condition of the Society must be assigned to its active President, Dr. C. G. Hewitt, Dominion Entomologist, who presided most worthily at the fifty-first annual meeting held in Toronto on the 5th and 6th of November last. This meeting was well attended, and many valuable papers were presented. Considerable discussion took place on various subjects of importance, particularly on the outbreak of the Army-worm in Canada in 1914.

Following is a list of the chief papers and addresses:

"Applied Entomology in Canada: Its Rise and Progress," the address of the President, Dr. C. G. Hewitt.
"The Habits of Spiders" (illustrated), by Prof. J. H. Comstock, Cornell University.
"Jean Henri Fabre, the French Entomologist," by Prof. W. Lochhead, Macdonald College, P.Q.
"Insects of the Season," by Prof. L. Cæsar, A. Gibson, W. Lochhead, A. Cosens, J. A. Morris, W. A. Ross, C. E. Grant, and C. E. Petch.
"The 1914 Outbreak of the Army Worm in Canada," by A. Gibson.
"The Army Worm in Ontario in 1914," by A. W. Baker, O.A.C.
"Mountains and Hills," by Dr. T. W. Fyles, Ottawa.
"Experiments with Poisoned Bran Baits for Locust Control," by A. Gibson, Ottawa.
"An Imported Red Spider Attacking Fruit Trees," by Prof. L. Caesar.
"Cherry Fruit Flies," by Prof. L. Caesar.
"Control of Forest and Shade Tree Insects of the Farm," by J. M. Swaine, Ottawa.
"Variation in the Hedgehog Caterpillar," by A. Gibson.

The Canadian Entomologist, the monthly journal of the Society, continues to maintain its high reputation and its wide circulation in spite of the increased subscription price. The 46th volume, completed in December last, is the largest and most fully illustrated that has yet been published.

During the year 1914 and since the last meeting of the Royal Society, the Ontario Entomological Society lost two of its best known members. Mr. H. H. Lyman perished in the disaster to the "Empress of Ireland" on the 29th of May—a few days after he had presented his report as delegate of this Society. Dr. William Saunders, ex-Director of the Dominion Experimental Farms and one of the charter members of this Society, died at his home in London on Sept. 13th. In his Presidential Address at the Annual Meeting in Toronto, Dr. Hewitt spoke very feelingly of the loss of these two highly esteemed members and ex-presidents of our Society, and paid a high tribute to their memories. Besides, our worthy and revered member, Rev. Dr. Bethune, who knew both very intimately for many years, has written notes of high appreciation in the 45th Annual Report.

W. Lochhead, *Delegate.*

INSECTS OF THE SEASON IN ONTARIO.

L. Caesar, Ontario Agricultural College, Guelph.

The past season with its abnormal amount of rainfall has been much more favorable for the development of plant diseases, both fungous and bacterial, than of insect pests.

Codling Moth (*Carpocapsa pomonella*). The most interesting thing about the Codling Moth was that in the Niagara district, where the amount of injury done by the second brood is usually very much greater than by the first, this year for the first time in my experience things were just reversed, the second brood being remarkably small, though the first brood was about as abundant as usual. Probably the excessive moisture was the chief reason for this, though other factors may also have been at work.

Plum Curculio (*Conotrachelus nenuphar*). This insect also was apparently less abundant than usual, although the fruit in neglected apple orchards suffered a great deal of injury both from spring and fall attacks. On some trees nearly every apple was deformed.

San José Scale (*Aspidiotus perniciosus*). The season of 1914 with its dry summer and long open fall was remarkably favorable for the increase of San José Scale. This was not true in 1915, for this year, so far as my observation enables me to judge, the increase has been less rapid than usual. This spring was also favorable for good results from careful spraying. With a single application we were able to destroy almost every scale in an old orchard that would otherwise have been nearly all dead by now. Lime-sulphur, strength 1.035, was used on one part of the orchard; Soluble sulphur, strength 12½ lbs. to 40 imperial gallons, on another part, and Scalecide 1 to 15 on a third. All were about equally satisfactory this year.

Blister Mite (*Eriophyes pyri*). For some unexplained reason the increase of Blister Mite, even in unsprayed orchards, the last two or three years has been very slight; in fact some trees seem to have fewer leaves infested than three years ago.

Leaf-Rollers [*Tortrix* (*Cacœcia*) *rosaceana*, *T. argyrospila* and *T. semiferana*]. (See p. 163.)

Capsids Attacking Apples (*Neurocolpus nubilus, Paracalocoris colon, Lygidea mendax and Heterocordylus malinus*). All four of these Capsids were found on apple trees but not all in any one orchard. *Lygidea mendax* was found in the greatest number of orchards, but *Neurocolpus nubilus* has apparently been the most destructive. It was sometimes found with *Lygidea mendax,* but in other orchards was the only species present. *Heterocordylus malinus* apparently did almost no harm and was much more common on hawthorns than on apples. *Paracalocoris colon* was also scarce. *Lygus invitus* is abundant in the Province but has not yet been found attacking apples or pears. Mr. Crawford's paper gives an account of our work on *Neurocolpus nubilus.*

Tent-Caterpillars (*Malacosoma americana* and *M. disstria*). These caterpillars still destructive in the eastern half of the Province, though Mr. E. P. Bradt, the district representative at Morrisburg, informs me that a large percentage, apparently 50 per cent., of the eggs failed to hatch and fully 50 per cent. of the caterpillars died before reaching maturity. There has been a gradual decrease the last two years in the numbers of both species down east, but this is not true of the western part of the Province, into which they are gradually spreading.

M. americana is now very abundant, at least as far west as St. Thomas. It has not yet, however, so far as I could see, become numerous in the extreme western counties. Around Guelph there are many egg masses this year, and, therefore, prospects for a severe infestation next year. *M. disstria* west of Toronto does not seem to be nearly so abundant as *M. americana.*

FALL CANKER-WORM (*Alsophila pometaria*). Throughout a considerable stretch of territory from Grimsby west, including Hamilton and Dundas, the Fall Canker-worm is very numerous and destructive. It is also very abundant in some forests in Norfolk County where the American elms, basswood, wild cherry, blue beech, birch and oaks were either partly or entirely defoliated. Elms suffered most. Maples were not so severely attacked as the other trees mentioned. Several other kinds of loopers were also prevalent on these trees, but not in nearly so large numbers as the Fall Canker-worm.

PEAR PSYLLA (*Psylla pyricola*). Early in the season it looked as if pears were going to be much infested by this insect, as adults and eggs were abundant. However, the cold weather of May destroyed all but a very few. By autumn a few orchards were again badly infested.

APHIDS. On apple trees there were many aphids this spring up to a few days before the blossoms were ready to burst. They then almost completely disappeared in all the orchards that I had an opportunity to examine, so that apple trees suffered very little from any of the leaf and fruit infesting aphids.

The Woolly Aphis (*Schizoneura lanigera*) in some districts was abundant, especially on young shoots in late summer and autumn. On cherry trees at Guelph the Black Aphis (*Myzus cerasi*) was very conspicuous and much more numerous than for many years past. It was also very troublesome in the Niagara district.

When moderately early peas were just beginning to bloom in Norfolk County hundreds of acres of them grown for the canning factories were threatened with destruction through the abundance of the Pea Aphis (*Macrosiphum pisi*) on the blossoms and new growth. Fortunately there came several days of very hot weather with occasional heavy downpours of rain and almost all the aphids disappeared. Sufficient damage, however, had been done to lessen the yield considerably and in some fields almost to destroy the crop. The Pea Aphis has done more damage the last few years in Ontario than it formerly did.

PEACH BORER (*Sanninoidea exitiosa*). Many complaints have been coming in of injuries from this borer, particularly from those districts where peaches have only recently been grown to any appreciable extent. I suspected at first that the gum oozing out of the trunks of the trees as the result of winter injury was being mistaken for the work of the borer, but my observations this year in Norfolk County showed that such was not necessarily the case, as nearly every tree in some orchards was attacked by from 1 to 20 or more borers. We have done some preliminary work on the control of this pest, and in this connection have also worked out fairly well its life history for this Province. It will be interesting to some to learn that adults appeared in Norfolk County as early as July 15th and continued up into September. One female in Niagara was seen on September 11th.

LESSER PEACH BORER (*Aegeria pictipes*). The numerous cankers on peach trees in many orchards in the Niagara district have given ideal conditions for the increase of this insect, so that it is to-day very prevalent in that district. Control measures under the circumstances are not easy.

ROSE CHAFER (*Macrodactylus subspinosus*). Near Fonthill several vineyards had almost every grape cluster destroyed by this pest. I visited the district as soon as informed of the trouble, but it was then too late to do anything as the beetles had already begun to disappear. Several acres of waste sandy land lying alongside the infested vineyards showed ideal conditions for bringing about just such an outbreak.

IMPORTED RED SPIDER (*Tetranychus pilosus*). This spider was found as far east this year as Trenton. It continues to do considerable injury, especially to European plums. Some trees, however, that were badly infested last year were only lightly attacked this year. Moreover, in some apple orchards trees heavily infested just before bloom were comparatively lightly infested a couple of weeks later. It is very probable that weather conditions have a very important part in the control of this pest as of so many others.

GRAPE-VINE FLEA-BEETLE (*Haltica chalybea*). There were again many complaints of injury from this beetle, especially in the Niagara district.

GRAPE LEAF-HOPPER (*Typhlocyba comes*). This insect was very abundant in the Niagara district. Red grapes were, so far as I observed, much worse attacked than blue. The foliage on many of the former in September was so brown from injuries that one would expect the fruit at picking time to be inferior in quality. I have had no opportunity to test whether this was so.

RASPBERRY SAW-FLY (*Monophadnus rubi*). This raspberry pest is very widespread in the Province and has the last few years been doing more damage than usual. One large raspberry plantation near Vineland was almost completely defoliated by it this year.

IMPORTED CURRANT-BORER (*Aegeria tipuliformis*). Almost every currant plantation is infested by this borer. In some cases a very large number of the canes are found to be attacked.

GLASSY CUTWORM (*Hadena devastatrix*). Last autumn at our annual meeting I reported that some fields of wheat had been badly injured by this cutworm. The caterpillars in November last varied in length from about ½ to 1 inch; hence we expected these over-wintering caterpillars, where numerous, to do much damage. As soon as growth began in spring reports started to come in of fields of wheat and barley being attacked. Several fields of wheat were almost ruined by the severity of the attacks. A few Army-worms, but only a very few, were found among the cutworms. As the Glassy Cutworm works under the surface of the soil farmers were advised to use the poisoned bran, harrowing it into the soil in the evening. I did not receive any reliable accounts of the degree of success obtained. About the usual number of reports of damage by other kinds of cutworms here and there throughout the Province were received.

STRAWBERRY WEEVIL (*Anthonomus signatus*). A few more complaints than usual were sent in of injuries from these insects.

IMPORTED ONION MAGGOT (*Pegomyia ceparum*). It is worth recording that in the great onion marshes of Kent County I could scarcely find a root maggot when visiting the district this summer. Growers tell me they are never troubled by it. This is strange, because onions have been grown on these marshes for at least fifteen years, and, as the Onion Maggot is a very troublesome pest in many parts of the Province, one would expect it to do even more damage in the marshes where onions are grown on a larger scale than anywhere else in Ontario.

SLUGS. In Oxford County the district representative stated that Slugs were so abundant this spring that some farmers claimed they were destroying the corn just as it was coming or had come through the ground.

MILLIPEDES. Last year, but more especially this year, Millipedes were very abundant and several correspondents asked for methods of destroying them. Some work was done in testing different substances. Of these tobacco seemed the most satisfactory, although it was not a complete success. The Millipedes are repelled by it and, where they come into close contact with a moderately strong solution, are slowly killed. Dusting tobacco refuse thickly over the garden where they are troublesome and then watering it well with the hose once or twice a day for a few days seems about the best method, and the least dangerous to the plants. It is probable that placing decaying fruits or other decaying vegetable matter here and there in little heaps among infested plants and then pouring scalding water over such traps daily would gradually do a great deal to free the garden of the Millipedes. They are very fond of collecting under such decaying refuse and roam around in the dark so freely that they would be very likely to find the baits.

SPITTLE BUGS (*Cercopidæ*). This seems to have been a remarkably favorable year for the multiplication of Spittle Bugs. Complaints of the great numbers of froth masses on the grass came in from Clarksburg, Mount Forest, Ridgeway, Thornton, Oakville and several other districts. A few pasture fields near Oakville were so badly infested that the farmers, fearing injury to stock if they fed on the infested grass, mowed the pastures and destroyed the cut grass.

A SARCOPHAGID ATTACKING THE FOREST TENT-CATERPILLAR (*Sarcophaga aldrichia* Parker). In 1914, while engaged in some investigation work in the County of Dundas, I observed that many of the pupæ of the Forest Tent Caterpillar were parasitized by what I considered to be the larvæ of a Tachinid Fly. On further examination at Mountain, Kempton and Morrisburg I estimated that close to 90 per cent. of all the pupæ contained what seemed to be this same larva. About 30 of the cocoons were gathered and brought to Guelph, though it was nearly two weeks before I reached there. On my arrival the cocoons were all transferred to a pint jar, in the bottom of which an inch or so of sand was first placed. The jar then was covered with cheesecloth. In May, 1915, I happened to glance at the jar and to my surprise found seven dead and one living Sarcophagid. These Dr. J. M. Aldrich kindly identified for me. He states "The species is one which Mr. R. R. Parker now has in manuscript as *Sarcophaga aldrichia,* n.sp. His article is completed and, I think, is deposited with the Boston Society of Natural History for publication, but I am not quite sure on that point. I will send him a quotation from your letter if you do not mind, as it indicates a considerable economic importance for the species which is widespread, occurring in the Puget Sound region."

If I am correct in my opinion that the death of the pupæ was due to the larva of this insect and not to disease, we have here a very good example of what seems to have been only comparatively recently fully admitted, namely, the true parasitic habits of some Sarcophagids.

PHOROCERA DORYPHORÆ. In June Prof. T. D. Jarvis called the attention of my assistant, Mr. A. H. Cowan, to the white eggs on the back of Colorado potato beetles at Grimsby. Mr. Cowan reported to me and on my suggestion reared a few adults and captured a few more that were attempting to lay eggs. Dr. Aldrich identified all these as *Phorocera doryphoræ,* a parasite that, as he says, has been bred repeatedly from this host.

Mr. Cowan made the following observations: "Eggs begin to be laid in June. At first they seem to be laid only on adult beetles, but later to some extent on the slugs. From June 18th to July 13th eggs were found mostly on the beetles, ⅓ to ½ of the beetles being affected. Early in July some were found on larvæ also, but always on nearly full-grown larvæ. The total time from egg to adult fly would appear to be about one month. On September 15th the eggs and adult flies were again found at Vineland."

At Simcoe I observed on several occasions what was probably this same Tachinid attempting to lay eggs on full-grown larvæ of Colorado potato beetle.

POPLAR SAWFLY (*Trichiocampus viminalis,* Fallen (?)). On September 28th the Parks Commissioner of Toronto sent me a few Sawfly larvæ that were attacking the foliage of Carolina poplar in the City and asked for the name of the insect and the method of control. On looking over the list of insects given by Dr. Felt in the New York Museum Memoir 8 as attacking poplars I found that the description given there of the larvæ of *Trichiocampus viminalis,* Fallen, agreed very closely with the larvæ I had received. The latter were, when full grown, nearly one inch in length, orange-yellow in color, though some had a decided greenish tint. The head and caudal plates were black, and on each side of the body were two rows of distinct black spots, the spots in the upper or subdorsal row being three or four times as large as those in the lower or stigmatal row. On the back and sides were numerous white hairs arising in thin tufts from numerous tubercular-like areas on each segment. These hairs were not more than ¼ as long as the width of the body.

I wrote to the owner of the infested trees for further information on the habits of the insect. The following extract is taken from his reply:

"The caterpillars were green at first, changing to yellow as they grew larger, apparently being full grown by the time they had eaten a full sized leaf. They were all side by side on the under side of the leaf tight together, eating from the edge away from the stalk towards it. That is to say, their heads were away from the stalk and they kept getting towards the stalk as the leaf was eaten away. Some of them grew faster than others, or seemed to, and as the leaf narrowed down they dropped off, thus leaving the smaller ones to finish the leaf. When I first noticed them they were small and green, and I should say there were about twenty on a leaf. It was full on the outside edge with all lying the same way, heads from the stalk of the leaf, the middle ones parallel with the thick membrane of the leaf, that is the continuation of the stalk. After dropping off the leaf they crawled all over the board fence and up the side of the house everywhere off the ground looking for holes in the fence. They went into every hole or crack they could find. The fence was covered with them. Into some overalls that were hanging on the line they got and when found were in a cocoon. Every leaf that they were on was completely eaten except the stalk, and the continuation of it right to the point. I notice that it is not a leaf here and there, as all the leaves on some branches are eaten and others not touched. I should say they have been on about 1-20th of the branches of the trees and eaten them. As there are six trees about 35 feet high, you may guess the number of them. I can only say there were thousands. I killed thousands myself with a broom on the fence."

THE IMPORTED WILLOW AND POPLAR BORER OR CURCULIO.

(*Cryptorhynchus lapathi* L.).

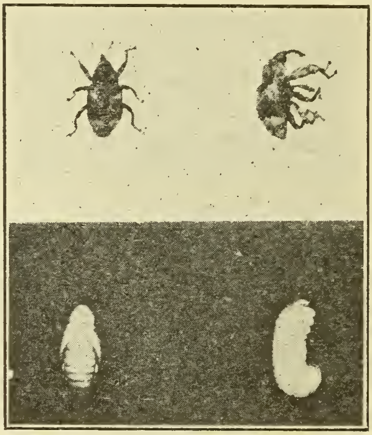
L. CAESAR, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

About the middle of August I was requested to investigate the injury done by a borer to willows and poplars in the eastern part of Toronto Island. I visited the district on August 21st and again September 8th. On the latter occasion

J. E. Howitt, Professor of Botany, kindly accompanied me to assist in the identification of the species of willows and poplars that were attacked and also of those that were immune.

The insect in question was, as suspected, the Imported Willow and Poplar Borer or Curculio. The total damage done on the island was not large but was sufficient to convince the Superintendent of Parks that if the insect were to spread throughout the island and attack all kinds of willows and poplars, it would destroy the beauty and attractiveness of Toronto's favorite summer resort. One can easily understand why he should feel alarmed when we consider that about 90 per cent. of the trees on this island consist of willows and poplars, because these are the chief kinds that will thrive in its light, sandy, moist soil.

My observations showed me that before I could suggest the right means of control it would be necessary to know two things: first, at what time infested trees should be cut down and burned to destroy the maximum number of the insects; second, what species or varieties of willow and poplar, if any, were exempt from attack. If the latter species were known they could henceforth be substituted for the kinds subject to attack.



Willow Curculio: two adults, a pupa and full-grown larva.
(All about natural size.)

On looking over the literature on this insect I found that to satisfy myself on these points I should have to devote whatever time could be spared this autumn to finding out whether the borer differed in Ontario in any important respects from the accounts given by Kirkland, Jack, Webster, Chittenden, Felt and others. The following are the results of my investigations:

LENGTH OF TIME THE BEETLE HAS BEEN IN THE PROVINCE AND PRESENT DISTRIBUTION.

This beetle, which is known to be a native of Europe and of parts of Asia, and which is supposed to have been imported into the United States about the year 1880, was not, so far as I have been able to discover, found in Ontario until the year 1906. That year Mr. Cosens took it at High Park, Toronto, and Prof. E. J. Zavitz at Ridgeway and Beamsville. These discoveries in three widely separated localities lead me to believe that it must have been in the Province several years earlier. Up to the present time I have records of its presence at the following additional places: St. Catharines, Grimsby Beach, Grimsby, Winona, Fruitland, Guelph, Elmira, Willow Grove near London, Toronto Island, Port Hope, Trenton, Hillier (Prince Edward County) and Montreal (Quebec).

There has been very little opportunity to examine other parts of the Province, but the above localities show a very wide distribution throughout the Province, especially along the great waterway on the south. It is apparently, however, not yet all over the Province, because I have been in several localities where there seemed to be no evidence of its work, and Dr. E. M. Walker tells me that he has not seen any evidence of injury from it at Lake Simcoe. Montreal, near which Mr. Swaine reports its presence, seems to be the only place it has been seen in Canada east of the Province of Ontario, though very likely it is present in several localities but has not been noticed.

Host Plants.

In Europe this insect attacks several species of willows and poplars and also a few species of birches and alders, including our common alder (*Alnus incana*).

In the United States a perusal of the writings of Jack, Kirkland, Webster, Chittenden, and Felt, show that scarcely any species or variety of poplar or willow, whether native or imported, is entirely exempt and that the birches (*Betula pumila* and *B. nigra*) are also occasionally attacked. I do not remember seeing any definite record of its having been found in alders.

In Ontario I have devoted every opportunity I could get to discovering the host plants and the degree of infestation of each. Prof. Howitt has assisted me greatly in determining the species whenever I was in doubt. I find that the insect prefers Balm of Gilead (*Populus candicans*) and Balsam Poplar (*Populus balsamifera*) to any other variety of poplar, but that it is sometimes quite abundant in Carolina Poplars, especially where the above species are not present. At Guelph the Balm of Gilead is severely infested in a small clump of poplars on the College grounds, but the other poplars in this clump, consisting of the Carolina, White, Large-toothed and Lombardy species, are untouched. By the edges of a woods not far away from the College the Balsam Poplars are much injured by the pest, but the American Aspens alongside them are uninjured. The same was true of the aspens near infested Scrub Willows in the swamps.

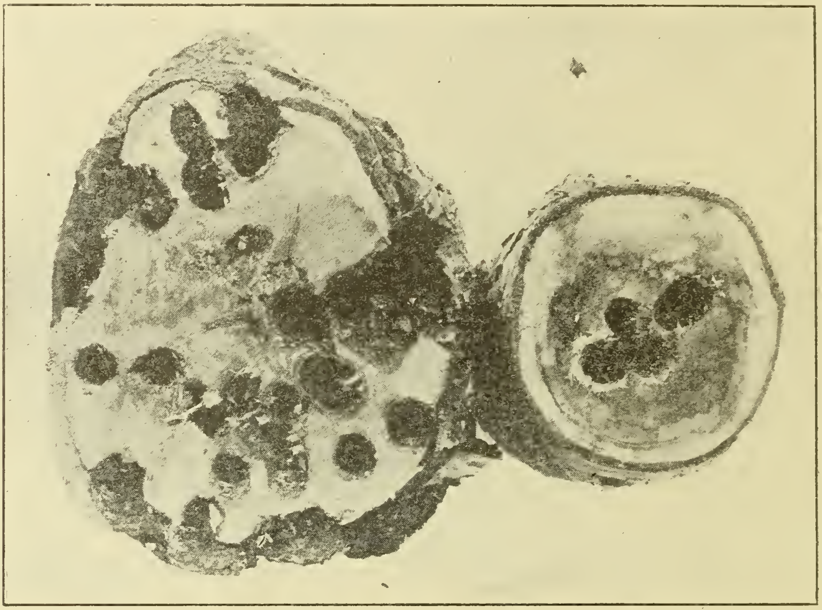
Of the willows the worst infested are our native Scrub Willows found so abundantly along streams. A tree willow, whose species could not be determined at this season of the year, was also severely attacked. This willow grows 25 feet or more in height, has not so large spreading branches as the Golden or White Willow (*Salix alba*) or the Crack Willow (*Salix fragilis*) but has much more slender and drooping branchlets and smaller, more delicate leaves. It is evidently a native species. One ornamental Weeping Willow in a lawn at Winona was killed by this borer last year. It was the dark-bark type of Weeping Willow, apparently an imported tree. Of the other willows we have not seen more than a very light infestation on the Crack Willow, and the White Willow has been entirely uninjured, as also the Glossy Willow (*Salix lucida*). There are not many Babylonian Willows to be found, but so far they too have been uninjured wherever examined.

Comparing what we have observed in Ontario with what has been written of the host plants in the United States, it seems quite clear that Balm of Gilead, Balsam Poplar, and our native Scrub Willows, along with one or two native tree willows, are the favorite food plants. Next to these would appear to be the Carolina Poplar (*Populus deltoides*).

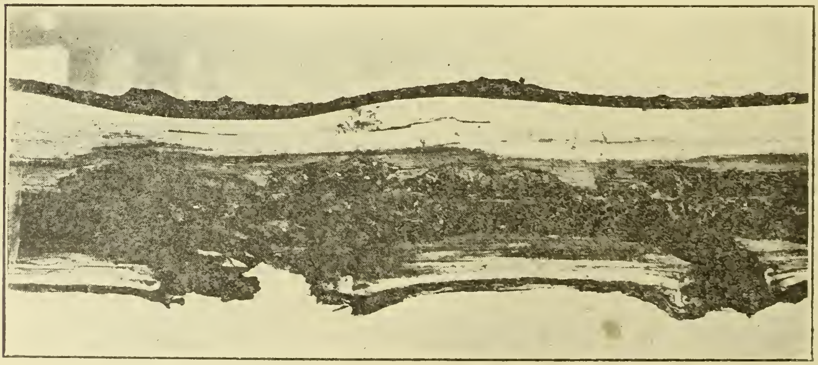
No alders were found infested even when in the midst of infested scrub willows. Birches have also appeared to be exempt in Ontario.

NATURE OF THE INJURY.

The photographs show sufficiently well the sort of injury done. It is all caused by the larvæ. These work both in the sapwood and heartwood in older trees and in the heartwood of very small trees. The borers seem to prefer the base of the smaller trees, but they are found on larger trees as high as 15 feet or



Cross section of a young poplar and of a larger willow tree, near the base, showing the work of the borers. (About natural size.)



Longitudinal section of a poplar tree, showing tunnels made by the larvae. (Slightly reduced.)

more. In old trees with rough bark they usually work in the lower branches instead of in the base of the trunk. Often there are so many tunnels, especially towards the base of the tree, that it is weakened and easily broken down by a strong wind. It is quite common to see Scrub Willows killed and also small poplars. The swellings on the bark of poplars where the larvæ have entered, and also the exit holes, cause the trees to look unsightly, and these, along with the castings around them composed of small tissues of wood from the tunnels, dust and fæces, easily reveal the presence of the insects. The total number of trees destroyed in the Province must be large, but the Scrub Willows are of very little value and, though the Balm of Gilead and Balsam Poplars are of much more importance, they can scarcely rank among our valuable trees. Fortunately not many Carolina Poplars seem to have been killed yet. These are good shade and landscape trees and their loss would be deplorable.

LIFE HISTORY.

Adults.—The adult is a snout beetle, stout, about one-quarter inch long, black, with the body and legs mottled with light pinkish or grayish white scales. These scales are so abundant on the sides of the prothorax and also on the anal third of the wings as to cause these parts to be pale pink or white. The upper surface of the body is rough, being coarsely and deeply punctured, and having longitudinal furrows on the elytra. The rough appearance is increased by the presence of a few tufts of black scales scattered here and there over the thorax and elytra.

I do not know how early the adults begin to appear. In willows at St. Catharines examined about June 20th, 1914, the larvæ seemed full grown but no pupæ were seen. As Kirkland estimates the pupal stage at about 18 days, it is probable that adults would have been found last year on these trees early in July. Mr. F. Morris found many adults on willows near Port Hope the first week in July, 1915. I have captured a few in August in previous years. By September 8th, 1915, by far the majority seemed to have emerged at Toronto Island but they still continued to appear this year all the first half of October, the weather being warm. An examination on October 23rd showed a few live adults still in their burrows in poplars, also some pupæ that looked healthy and four larvæ, but three of the latter were dead. The fourth looked healthy but, when handled, did not move, so may also have been dead. In all the accounts I have read it seems to be assumed that very few adults are to be seen in the spring. Kirkland found one which he remarked was "probably an overwintered specimen." But the adults in May are not nearly so few in number in Ontario as one would expect from the different accounts of the insect given. Three of my nursery inspectors each captured several specimens and saw others this last May on poplars and willows in the nursery rows. There were a few also on apple trees in adjoining rows. It is not known whether these passed the winter in the trees as adults, pupæ or larvæ, or whether they emerged in autumn and wintered over under shelter. The important point is that there was a considerable number of adults found at that time of the year, indicating that many others also were probably present. The adults in autumn hide on cold days but appear on the trees when the weather is warm. They feed on the juices exuding from injuries at the points of exit, also upon the young twigs, where they seem to prefer the neighborhood of leaf scars, in which the small feeding punctures are often seen. These punctures, however, may also be found in various other parts of the tree and sometimes even on the bark of dead fallen branches. In breeding cages I fed them on pieces of ripe apples and peaches, both of which they relished greatly. I do not know the length of life of these autumn adults, but five specimens caught in September were still alive almost a month later when I removed them from the cages. The last adults were seen in the open on October 11th. One found then was ovipositing.

Eggs.—Oviposition probably begins early in August, but with the very limited time at my disposal the first adult I could find doing this was on September 29th. After that date I saw several both in the cages and outside. It is very probable the beetles found in May oviposit in spring, as in Europe, eggs are laid both in autumn and in spring. The eggs are laid, as one would expect, at such places on the tree as we find the injuries later. Sometimes this may be at the base of a bud or small branch, but on the Balm of Gilead trees under observation and also in the cages it was just as commonly on the internodes, sometimes where there was a small rupture in the bark, sometimes where there was no rupture. About one hundred egg punctures in all were observed and several ovipositions. Before laying the egg the female eats a small hole, usually easily visible to the eye, through the bark to the full depth of her proboscis; at the bottom of this she makes one, two or three cavities. Where there are more than one they are a little distance apart from each other. Then she turns around, inserts her protruded ovipositor into the hole and lays an egg in each cavity. The making of the hole and laying of the egg is a slow process. I observed one which had already been at work some time when noticed and from the time she was first seen until the eggs were laid was a little over thirty minutes. One female was observed after laying the egg to turn around and insert her beak into the hole many times as if putting in small particles of bark. The eggs are pale translucent whitish, oval, about 1.5 mm. long and a little more than half as wide as long. Each female probably lays many eggs. One about to oviposit was dissected and only three mature eggs were found in the ovaries, all the others being much smaller.

It is hard to say how long it takes the eggs to hatch. As stated the first oviposition was observed on September 29th, but an examination from time to time of egg punctures at Guelph revealed no larva until October 7th. On October 25th, fourteen egg punctures on a Balm of Gilead were examined and in five of these sound unhatched eggs were seen, in five others tiny living larvæ, and in the remaining four hatched eggs but no larvæ. All previous examinations showed more unhatched eggs than larvæ on all trees.

Larvæ.—The freshly hatched larva is white, curved, and has a brown head. Full-grown larvæ are, as shown in the photograph, stout, about half an inch long, white, curved and have a brown head and no legs.

The young larvæ found were in every case very near where the eggs had been deposited, and had not eaten their way through the bark. They appeared to be settled down comfortably for the winter. Only in one case was there any evidence of a larva having reached the cambium, and that one was doubtful.

The discovery of so large a percentage of healthy eggs along with these tiny larvæ would suggest that the winter is probably passed in the egg stage as well as the larval. We saw above that it is apparently passed also either in the adult or pupal stage or both, with a slight possibility of there being some full-grown larvæ too remaining over in the burrows.

A study of the burrows shows that in spring the larvæ work obliquely into the sapwood, throwing out many castings at first as they do so. When they have gone in some depth the entrance appears to become closed, at least in poplars, by a callous growth, referred to above. Once in the wood the burrows run nearly straight. The total length of a burrow is from 2½ to 4 inches. In spring the larvæ clearly grow very rapidly, as by the end of June they are about full grown in many cases. When this stage is reached they evidently turn back in their tunnels and enlarge them either to the place of entrance or else to some more convenient exit. They then return to the far end of the burrow, make a little chamber for pupating, then with head toward the exit change into a white pupa. The adult works its way out through the tunnel enlarged by the larva.

MEANS OF DISTRIBUTION.

The insects have been widely distributed by shipping out poplars and willows from infested nurseries. The tiny larvæ or eggs in these in the spring would easily escape notice. In addition to this means there seems no doubt that the adults fly about from place to place. They have large under wings well adapted for this purpose. Flight is probably late in the evening or at night, as I have never seen an adult fly when observing them during the day.

METHODS OF CONTROL.

In most cases no effort will be made to control or prevent injury from the pest, but in parks like Toronto Island, control measures are very necessary. It was my intention to suggest that all infested trees be cut down in the winter and burned early in spring, but since learning from my inspectors of the discovery of a considerable number of adults in May which very probably lays eggs, I have thought it wise to suggest that the cutting down and burning should not be done until the first or second week in June, so that all the insects might then be caught in the larval stage. This should lessen the numbers of the insect greatly. Then to avoid future loss in these places I think that the willows most exempt from attack, viz.: the White Willow (*Salix alba*), one of our largest and best willows, and possibly the Glossy Willow (*Salix lucida*) should be planted instead of those removed. Also White Poplar and Aspen Poplar might be substituted for the Balm of Gilead, Balsam Poplar, and even for Carolina Poplar. Of course if Soft Maples, Dogwoods or other suitable trees or shrubs will thrive in these places, they would be preferable to any of the above. I should be very pleased to have further suggestions from anyone present.

THE PRESIDENT: I am sure we have all listened with much pleasure to Mr. Caesar's two excellent papers. They are now open for discussion. We are pleased to see with us to-day Professor Zavitz, the Provincial Forester of Ontario, and he has no doubt something interesting to say regarding the papers just read.

PROF. E. J. ZAVITZ: Mr. Chairman, I came here to obtain information, and this beetle to which Professor Caesar has been referring is naturally of interest to foresters. I first saw it in the Niagara District near Ridgeway, working in the scrub willows. This season, in visiting that district early in the summer (it is a favorite collecting ground) I found that these willows had been entirely killed.

I think the chief danger from this insect is to our Carolina Poplar (*Populus deltoides* Marsh) which, to my mind, is the most important poplar from the foresters' standpoint. We were beginning to think that the Carolina poplar would be a very important tree in sand planting and in fact we are using considerable numbers in Norfolk County. I regret to find that this insect is working in that tree. Apart from the willow holts or basket willows, the damage to willows will be small. We use the other willows to a very small extent in forest planting.

The chief injury from the standpoint of the forester will likely be to the poplars and especially the Carolina Poplar.

The President: Perhaps Mr. Swaine would like to make a few remarks in this connection.

Mr. Swaine: Mr. Chairman, I have had very little opportunity to study this beetle in Canada. Some years ago in Ithaca it was very common in the basket willow in the plantations there and did considerable damage. In Canada I have found it only near Ste. Anne's and it was there in the common scrub willows and not very abundant. I have not had it sent in in the last three or four years in any numbers from any part of Canada except Ontario and southern Quebec, and very few reports have been received. Mr. Caesar's account was very interesting, indeed; the life-history is just as I remember it on the different occasions I have studied it, and the control measures usually given are not very effective; it is a very difficult matter to control this beetle. On the smaller willows no special effort to save any particular tree is worth while and the destruction of the infested trees is perhaps the only effective method. Only a few of the willows that are affected are worth saving.

Mr. Winn: Professor Caesar mentions the keeping of the beetle alive on apple or peach. I may say he very kindly sent me ten specimens of the beetle to show what it looked like in order that I might recognize it if I ever found it alive. After a couple of days I turned the specimens out on a blotting pad and pinned two or three, then noticed that instead of there being ten there were only nine. The tenth was still alive and had crawled away. This I secured and placed in a tin box and after again taking it out three weeks later, apparently dead, it recovered. This shows how long the insect can live without food being given it, and how dangerous the insect might be when capable of living through a like shortage under natural conditions.

Prof. Caesar: One of the points that I would like very much to get information on is whether any person has found the adults of this beetle in the spring. It seems to be taken for granted in the U. S. literature on this pest that it does not pass the winter as an adult, and that there are no eggs laid in the spring, but the fact that we could find a considerable number of them in nurseries suggests that egg-laying in the spring is very probable.

Mr. Swaine: The specimens that I took at Ste. Anne's were, I think, all taken in the fall. This is some years ago, so I am not quite certain on this point, but believe that they were taken in the fall.

The President: I have no doubt that if any of the members get further information in regard to this beetle hibernating in the adult form they will advise Professor Caesar of the fact, and we will now proceed to the next paper.

Dr. Felt's paper was read by Mr. Gibson.

SIDE INJURY AND CODLING MOTH.

E. P. Felt, Albany, N.Y.

This type of injury has been unusually abundant in the western part of New York State for the past four years. It appears to have been figured and described first by John W. Lloyd in 1907 (Bul. 114, Ill. Agr. Exp't Sta.). He, however, attributed the damage to the work of the second brood.

Investigations the past season established the connection between late-hatching first brood larvæ and this type of injury. Many codling moth eggs are laid in the lake region the latter part of June and early in July on the fruit. The young larvæ hatching from these eggs enter the exposed, smooth surface of the developing apple and excavate a shallow gallery having a radius of approximately 1/16 of an inch. This is probably a manifestation of the leaf-mining habit of the young larvæ, recorded by a number of observers, in relation to those hatching from eggs deposited upon the foliage. A few days after entering the fruit many of the larvæ desert the initial point of injury and make their way to the blossom end. The impulse to desert a perfectly satisfactory shelter and brave the dangers of migration to the blossom end can hardly be explained as other than inherited and an outcome of the same unrest which, under other conditions, leads the larva to forsake the leaf mines and search for fruit. The attempt to enter the apple once more is frequently a failure on sprayed trees, owing to the poison deposited in the calyx cup in the after blossoming treatment. Unfortunately, so far as the apple grower is concerned, the young codling moth larva does not perish until the characteristic mark has been made on what should be an unblemished surface.

Records made during the past four years by Mr. L. F. Strickland, Horticultural Inspector of the New York State Department of Agriculture, show that as much as 20 per cent. of the fruit may be affected in this manner. Investigations by the speaker last summer indicate a somewhat general prevalence of such conditions along the south shore of Lake Ontario. In one orchard at Newfane, 9 to 12 per cent. of the total crop on three sprayed plots bore this side blemish, while in an Orleans county orchard similar plots showed from 25 to 35 per cent. side injury. The unsprayed or check plots in these two orchards had from 30 to 37 per cent. respectively, of the apples thus affected. It should be stated in this connection that very little "side injury" is to be found in Hudson Valley orchards.

The somewhat general limitation of this type of work to the vicinity of a large body of water leads us to believe that this variation in habit may be caused by local climatic modifications. There is on record a statement by Cordley to the effect that eggs are not deposited when the evening temperature falls much below 60° F. In this connection some interesting data has been published by Sanderson (N. H. Agr. Exp't. Sta., 19th-20th Rep'ts., 1908, p. 406). He finds that if evenings be cool, egg laying will sometimes be deferred for several days, and states that from June 9th to 15th, 1906, he was able to secure eggs but after that the evenings were cool until the latter part of the month and no eggs were obtained until June 28th. Again, in 1907, "no eggs were found until June 22nd * * * * though moths had been emerging since the 10th." An examination of records made the past four years by Mr. Strickland shows a fairly close connection between this type of injury and the rise of daily minimum temperatures above 60° F. The damage referred to above occurs mostly the last of June and the first half of July, and so far as records go, is preceded by a period of low temperatures which probably inhibit the crepuscular or nocturnal activities of the moth, and then with the rise of minimum temperatures above 60° F. we have the deposition of eggs and the development of side injury.

The low minimum temperatures from about the time the moths begin to emerge till the latter part of June, do not materially hinder the development of the apple and, as a consequence, when oviposition is possible the fruit is some size, smooth, and from observations in the orchard, appears to be more attractive to the moths as a place of oviposition than the foliage. Two, three and even four eggs were to be found upon apples here and there, though this would hardly be an average, and more than three-fourths of the eggs found were upon the fruit. This is the reverse of conditions recorded earlier by Messrs. Ball, Card, Pettit and Sanderson.

It will perhaps suffice to state in this connection that in the Hudson Valley, where "side injury" is comparatively rare, temperature records show no such prolonged periods after emergence of the moths begins where daily minimum temperatures fall below 60° F.

The "side injury" phase of the codling moth problem has a very practical bearing, since experiments conducted the past season show it to be extremely difficult, if not impracticable, to reduce damage of this character to a negligible quantity by one season's work. It happened that two of the experimental orchards mentioned above were very badly infested and in one, although the spraying was distinctly above the average, 25 to 33 per cent. of the fruit in certain plots showed the familiar side blemish. This was due largely to the fact that the injury was caused by newly hatched larvæ attacking the poorly, necessarily so, protected surface of the rapidly growing apple. These eggs, it is evident, were deposited by moths developing from hibernating larvæ, consequently this serious "side injury" was the logical development in a badly infested orchard when climatic conditions compel a late deposition of eggs, many of which may be placed on the fruit. This danger, in our estimation, is ample justification for urging thorough and annual sprayings of bearing orchards whether the trees happen to be fruiting or not. There are in most orchards, even if there is no crop, enough scattering apples to carry to maturity a number of codling moths, ignoring, if you please, the fact that Headlee and Jackson observed larvæ which developed to full size in water sprouts.

It is noteworthy in this connection that the experimental orchard of last season, not badly affected by "side injury," was sprayed annually and presumably thoroughly, even when not in fruit. The same was true of some other orchards where there was very little codling moth injury. That this comparative immunity could not be attributed entirely to accident was evidenced by the fact that just across a roadway from the orchard showing almost no injury, trees were found with 75 per cent. of the apples on the ground wormy.

The President: This paper of Dr. Felt's is of great interest to those who are engaged in fruit insect investigations, particularly insects affecting the apple. The Codling Moth damage, of course, is usually internal and quite serious, but on the other hand it is a kind of damage which, even if slight, may produce a blemish on the outside of the apple, which is very serious from the fruit grower's point of view, in view of the fact that it degrades his fruit. You may have a very fine apple, which ordinarily would rank as No. 1, but through some blemish produced in this way by the Codling Moth it is degraded to No. 3. This proves to be very serious in the case of the large fruit grower. In Nova Scotia, Mr. Sanders is making a study of a somewhat similar injury caused by the Budmoth, which also reduces the quality of the apple by a blemish of much the same nature as the one caused by the Codling Moth. I think it might be well to mention here that in his investigations Mr. Sanders found that there was injury being caused by another insect imported from Europe, and he sent me the other day a photograph of the injury caused by this insect, the Lesser Budmoth, *Recurvaria nanella.* As a number of men here have been working on insects affecting apples and fruit generally I have no doubt that they will have something to say in regard to Dr. Felt's paper.

PROF. CAESAR: In regard to the matter of side-worms, I may say that every persons who endeavors to spray thoroughly for Codling Moth finds that far the greatest trouble is to prevent the worms from entering the side of the apple, especially if there are two broods and if it is the first season the orchard has been sprayed. I do not know anything about the influence of temperature on this questions of side-worms, but I do know that in Ontario side-worm injury is abundant both on high land and on low land.

MR. GIBSON: Mr. Chairman, I should like to remark that in Dr. Cosens' report which he sent as Director, he makes a brief mention of the occurrence of the Lesser Budmoth on pear trees in Toronto, and he also mentions that it was quite abundant on an apple tree. This insect is treated of in a bulletin published by the U. S. Bureau of Entomology.

THE PRESIDENT: If there is no further discussion on this paper we will proceed to the next by Mr. Winn.

THE HOME OF GORTYNA STRAMENTOSA.

ALBERT F. WINN, WESTMOUNT, QUE.

This moth is one to which but little space has been devoted in our literature, but being a typically Canadian insect, perhaps you will pardon a longer and more rambling paper than intended for the meeting.

In Vol. XXXII, pp. 61-63 of the Canadian Entomologist, Mr. J. A. Moffat, late curator of our Society, published a copy of Guenée's description of the moth, an enlarged half-tone cut of it and some remarks on its occurrence. This was followed in the same volume by a note on p. 119 by Mr. Grote, and a reply on p. 133 by Mr. Moffat. The species has again been figured by Sir George Hampson in Vol. IX of the Phalænidæ of the British Museum, plate 138, to which we will refer elsewhere. From Mr. Moffat's article we quote the following: "*Stramentosa* has been taken regularly at Montreal for years past by collectors connected with the Branch of the Entomological Society of Ontario there, apparently none knowing of its existence there except themselves. Mr. Brainerd intends to make a vigorous effort to discover its foodplant next season."

Although over fifteen years have elapsed since this was written and we had already been hunting over ten years, the search for its foodplant and consequent laying bare of the life history has been carried on faithfully and well by various members of our Branch, and at last it has fallen to my lot to have the pleasure of entirely solving the mystery of its hiding-place. It is not necessary to particularize the members who have tried to locate it and failed; practically all of us interested in Lepidoptera have searched our Mountain for infested plants possibly tenanted by *stramentosa,* and we had a few years ago the aid of Mr. Henry Bird for a couple of days; but although we were actually within a few feet of scores of larvæ, they were not detected. It is doubtful if any other Canadian insect has had so much time and thought expended on its habits and life history, and as successive seasons closed with the flight of the moths around our street lamps in the fall, and occasional captives on flower heads, we began to feel certain that no visible clue could be hoped for in the plant and that nothing but sheer luck would ever disclose the secret, but we kept on pulling up and splitting down all sorts of possible and some impossible plants.

On the afternoon of September 13th, 1914, while walking along a path on our Western Mountain, near the ski-grounds, looking for edible fungi rather than for insects, I found a *stramentosa,* resting on a leaf of the rattle-snake root (*Nabalus racemosus*) and a minute later disturbed another on a plant of the same species. This plant was given a tug and it broke off short, but the root was easily dug up and was evidently bored. On going back to the first plant, it was also found to have been attacked. Things began to look interesting and mushrooms were put aside for another day. By tramping among the plants and beating them with a stick, a number of the moths were disturbed, either dropping to the ground or flying a short distance and hiding. Among the hundreds of plants in the neighborhood a plant here and there was pulled up and most of them showed they had been bored, and we felt so sure that the long-sought for plant had been stumbled across that a supply of seeds was sent to Mr. Bird so that he might have a supply of plants in his "garden of borers" at Rye, N.Y., ready for the larvæ that would follow another season.

Early this June, when the larvæ of the borers were beginning their work in burdock, thistle, cicuta, iris, etc., the same locality was visited, but the Nabalus plants were hardly visible above ground and those dug up showed no sign of attack. We concluded that we were too early, for the moth being later in appearing than most of the borers, it seemed possible that the egg was also later in hatching. The next visit was three weeks later and the plants were about two feet high, but the most careful search failed to find any trouble. Something had evidently gone wrong with our discovery of the previous fall and *stramentosa* was still surrounded by a mystery. One thing was very certain, however, namely, that if I had disturbed a dozen or so of the moths there must have been in the neighborhood scores or hundreds that were not seen, and as the number of examples seen about the lights each year was about uniform, there *must* be a lot of larvæ close at hand. If they were not in Nabalus, they must be in something else growing commonly there. Fortunately I was in a clear patch on a hillside and could get a sort of bird's-eye view of the tangle of weeds and undergrowth. A plant was noticed that we had seen in many places on Mount Royal Park and an isolated clump was selected. There was no wilted top nor brown leaf to indicate attack, but on splitting the longest stem down from the top, a boring was struck about a foot from the ground and a section containing the little larva was quickly boxed. Other plants were similarly treated but nothing was found, and it looked as if our day's take was going to be only one larva. Something suggested that we were again off the track, so we opened our box, removed the larva from its boring and had a good look at it. It was seen to belong to a different genus—*Papaipema,* probably *P. cataphracta,* and such it proved to be. This in itself was rather a discovery, as the insect, though common enough in Ottawa and elsewhere, is seldom found with us, and it seemed remarkable that the very first stem selected to be split open should have contained a larva, which prevented my continuing the process down to the ground, which is the simplest way of locating boring larvæ in their earlier stages. We could not recollect ever having pulled up a clump of this plant on any previous occasion and as we looked at the erect stems with their perfect foliage surmounted by the forming seed pods, which later on rattle merrily when touched, it seemed incredible that they should be bored; and yet, that little cataphracta had been in one stem, equally perfect externally. A cluster of stems coming from one root was grasped and given a tug. Up it came, and after giving it a shake, a fine fat larva about 1¼ inches long was seen shuffling back into its burrow. As we were extricating him, another dropped to the ground and was secured. This surely was our quarry at last. Another clump was pulled up, two more larvæ and so on, as many as eight being taken in one clump and no blanks, every clump seemed to be attacked. Other plants noticed here and there on the way home were examined and proved to harbour larvæ in their roots. There was, henceforth, no shadow of doubt as to the home of the *stramentosa.* But what was the plant's name? I tried to determine it by Gray's Manual of Botany, but was misled by the square stem in trying to locate it among the members of the Mint family. A specimen was sent to the Dominion Botanist and Mr. Adams kindly determined it as belonging to the genus *Scrophularia,* but did not like to state the species owing to the absence of flowers. On referring to Britton and Brown's Botany, our plant was easily recognized by the cut and description as being *S. leporella*—the hare figwort—but to make doubly sure, the original description was turned up in Vol. 33, p. 317, Bulletin of Torrey Botanical Club (1896)—so *stramentosa* may be given the common name of the "Fig-wort borer."

As I was leaving town for my holidays within a few days, the bulk of the larvæ and roots were packed up and sent to Mr. Bird, only a few being kept as I felt sure that on my return any desired quantity of full-grown larvæ could be secured and that the pupæ would be likewise found in due season. Mr. Bird was away on a *Papaipema* hunt in Illinois when the package arrived, but his son looked after it and was successful in obtaining the imagos and so quickly that we might almost suspect that he used an incubator in his anxiety to get the first bred *stramentosa.* On my return I found several larvæ had pupated, while the rest died of starvation owing to the drying up of the roots. A series of wet days and other contingencies prevented my getting any time to visit my hunting-ground till Saturday, August 20th, by which time it was supposed all would be in pupa. In the first clump selected a larva was found and evidence that there had been another, so I proceeded to get out my entrenching tool and began scraping away the earth carefully. At a depth of about two inches a fine yellowish-brown pupa lay exposed, wriggling about in a very lively fashion as if not at all appreciating being disturbed. Proceeding to a nearby clump resulted in two more—then six, which is the most found under one plant, and in the course of three-quarters of an hour, thirty had been boxed. Reluctantly we were compelled to stop, as the drizzling rain which had been falling was becoming heavier and the vegetation was decidedly moist to work among. The pupæ were all found in the same situation as the first, namely not over two inches below the surface, invariably on their sides, without any cocoon or cell and wriggling much when disturbed. All were within a foot's radius from middle of root. The question occurred: how would the moths emerge from those earthy homes? Would they force their way through the soil or would instinct tell the pupæ to come to the surface? Having brought home a supply of soil from the woods a layer was put in two breeding cages, 18 pupæ were placed in one cage and 12 in the other, all in a horizontal position, and were covered with about two inches of soil and on top was an inch or more of the *prepared fibre,* sold by the florist for growing bulbs. This I find an excellent material for keeping burying pupæ moist enough without inducing mold. Two days later the question was answered. Seventeen of the pupæ were visible, some were on their sides, but most of them were nearly vertical, tail up. To what extent the cremaster aids the tunneling process was not ascertained, but its structure is suggestive that it might be useful.

On August 30th my first moth appeared. The following evening I went straight from the office to the woods but it was nearly 6.30 when the ground was reached and four pupæ were all that were secured in what remained of the daylight. The next Saturday afternoon, September 4th, was warm and bright, rather too warm in fact for digging operations. Pupæ were found nearer the surface and two sticking up on end, cremaster up, as in the cages. Collecting at this date, though successful, is difficult, for the digging implement is almost sure to injure about as many pupæ as it unearths sound ones, so after cutting in two or dinting over twenty a piece of wood was substituted. It was not much improvement as the extra force required to use it bruised the pupæ instead of cutting them in two. On returning home it was found that twenty-six sound pupæ was the result of the outing. But this was not all, for two larvæ were found, one evidently sickly, the other full-grown and well below the ground ready to pupate. One empty pupa shell was also picked up and the plant above searched for the moth. Whether it was this one or another I disturbed during my search cannot be said, but happening to look down a moth was seen running along among the leaves on the ground and took refuge under one of them. When disturbed, she ran off and finally hid under another leaf—the performance exactly resembling that of *Amphipyra tragopogonis* which in England has earned for itself the common name of *The Mouse.* Several other moths had by now emerged in the cages and many pupæ were darkening up in color, betokening early emergence. In doing this one escaped and fell to the floor, without attempting to use its wings, and immediately scurried about on the floor in search of a hiding place. It was noticed that the moths in the cages all appeared to try to squeeze themselves as close into the dark corners as possible, often remaining two or three days without altering their relative positions. It is, of course, possible that during the night they may have flown or moved about and returned to their post before morning, but the habit of secreting themselves by day is evident.

Having a supply of living moths the next point was to secure eggs, and not having any experience in getting bred specimens of Noctuids to mate in captivity, I tried every plan I have ever used in the case of moths belonging to other families, but was unable to get a pairing among themselves, and freshly emerged females placed on the inside of screen doors and taken into the woods failed to "assemble" any flown males. Finally a large skeleton box, about thirty inches each way, covered with netting, was put in the garden, with stems of several figwort plants stuck vertically in the ground, as well as the cuttings of such perennials as were in flowers and some twigs and leaves smeared with sugaring mixture. After feeding all the moths forcibly, they were turned into the moth paradise. Two days later, success was attained, one moth having selected a blue-bell, and in the axil of the leaf deposited a cluster of eight eggs, irregularly placed, while lower down on the same stem were about ten eggs in a crooked line, the lowest barely an inch from the ground, and the moth was hiding under the lowest leaf which was drooping and provided a suitable shelter. The moth was brought indoors and placed in a breeding cage with cuttings of figwort and blue-bell stems, but evidently they were not attractive-looking, for the moth would not use them, but placed eggs in all sorts of places in corners, on the glass door, loose on the bottom and most curiously on and in the empty pupa cases of its own kind. It was hoped, by observing where eggs were laid in confinement, that the habits in nature would be indicated, but the results were unsatisfactory. In no case did it seem as if the eggs were placed otherwise than as a sort of makeshift, although the use of the axil of leaf and inside of pupa cases hinted that they would probably be concealed, that is thrust in somewhere; which might have been presupposed. However, knowing what the eggs looked like, and armed with a reading glass, we proceeded to the hillside the next Saturday afternoon and looked over the plants from the ground to the top seed-vessels. The inside of the latter were very carefully examined, as well as the little cluster of leaves closely pressed together at the foot of the plants ready for next year's growth. Nothing was found, and it looked as if the old saying about looking for a needle in a hay-stack might be revised to cover looking for a moth's egg on a mountain. Next day I was in a different place, but seeing some of the figwort, pulled up a clump just to see whether it had been attacked. It had—very much so. All of a sudden it occured to me that the natural place for eggs to be deposited to secure a ready access to food supply in spring had been overlooked, and that the habit of the female running on the ground should have been a sufficient clue. As is the case with many tall perennials that are bored, there remains of the previous year's stem a little tube extending a few inches above ground and forming a natural tunnel straight to the roots. Hastily, but carefully, with a penknife this was split open and four eggs were revealed. Others were found, as many as twelve in one case, and some of them were so slightly attached that many others may have dropped down the hole. This, of course, may not be the only place the female selects, but it satisfied me that in 1915 a good deal had been found out about the home of *stramentosa.* There is one brood per annum, the egg hibernates, the larva feeds wholly in the roots of the figwort, matures about the middle of July to August 10th, the pupa lies beneath the plant about two inches below the surface, bores its way to the surface tail first, the moth, emerging, tumbles the pupa over, and climbs very rapidly up the plant's stem, stops, holds its soft wings by its sides for eight to ten minutes, then when about half expanded, suddenly flaps them together over the back like a butterfly at rest, and remains in that position till the wings are fully developed, or about half an hour. The wings are then lowered, and the moth crawls into a corner and stays there. How long it takes for the wings to become dry enough for flight was not ascertained. Most of the moths emerged between five p.m. and eight p.m. No parasites were observed, but indoors the wriggling pupæ proved enticing to a pair of mice, and one of my small cages having a cotton netting in front was entered, with the result that there was a round hole in the net and the chrysalids went away inside the mice. They were evidently relished, for next night a trap caught one mouse and the following night the other. This suggests that field mice may greatly reduce the number of pupæ after they come up and wriggle about on the surface of the ground. The moth most closely allied to the figwort borer—*G. immanis,* the hop-vine borer—is said to be considered as a particularly choice delicacy by skunks (Can. Ent., XIV, 93-95), one hop-grower stating that he had seen ten acres where not a dozen hills had escaped their little noses. It may be that the absence of this odoriferous mammal from the neighborhood of Montreal has given *stramentosa* a chance to increase in the land.

Detailed descriptions of the various stages will be published shortly by my good friend, Mr. Bird, as in view of his wonderful knowledge of the life histories of the boring Noctuids, it seemed more in the interests of science that the making of descriptions and comparisons should come from his pen than from mine.

The President: We are very pleased to have Mr. Winn's paper, and I should like to thank him for the specimens of this interesting moth which he has placed in our National Collection here. It has been said to me by a keen external observer of the activities of this Society for many years that there is a preponderance of economic papers in our programme, and that this is not as it used to be, that in the old days there were more papers of a purely scientific character by such men as Mr. Winn, who are not professional entomologists but who follow entomology as their chief hobby. For that reason we are especially pleased to have Mr. Winn's paper. It would be a very bad day for the Society when papers of such a nature cease to appear in our proceedings, and for that reason also we shall look forward to hearing a number of other papers by our old friends who are not professional entomologists, such as Dr. Fyles' paper this afternoon and Mr. Morris' paper tomorrow. The paper is now open for discussion.

Mr. Gibson: The study of these Lepidopterous boring larvæ such as Mr. Winn has told us about is one which has always given great pleasure to those who are interested in rearing the larvæ of our moths. We have not, as yet, found this insect at Ottawa, but now that we know more about the larvæ and what they feed upon we hope that we may be able to find the species. The chief boring larva of this family which occurs in the Ottawa district is called the Burdock Borer, *Papaipema cataphracta*. This is quite a pest, some years attacking soft-stemmed flowering plants, such as dahlia, lily, etc., and in addition, of course, it occurs in burdock and thistle. I am very glad to know that Mr. Winn has donated specimens for the collections here.

Sir James Grant: Mr. President, I should like to make a few observations. I am happy to inform you that after a very careful survey of the Dominion of Canada, from Victoria on the Pacific to Halifax on the Atlantic, through the whole of Central Canada and New Ontario, that the work of this Entomological Society has proved of great practical value to Canada in the Department of Public Health. The information that you have given to our people on the part played by the house-fly as carriers of disease has conserved very materially the life of the people of Canada. Those house-flies play, as you know, a very important part in the dissemination of tuberculosis from sputum. There is now, I am happy to inform you, as you will find in my report recently presented to the Canadian Public Health Association at Toronto, a reduction in the past fifteen years of fully twenty-five per cent. in the number of cases of tuberculosis. I have lately gone through whole sections of Central Canada where fifteen years ago the disease was very common, indeed, hundreds of cases in nearly every direction. To-day, with difficulty, in those sections can you discover a solitary case of tuberculosis, and I am happy to inform this Association that if they continue the good work they have done in the past in the preservation of health by similar measures, and by the destruction of the house-fly, I am confident that the next ten or fifteen years will bring about a reduction of this disease of fully fifty per cent. The head of the Pasteur Institute, Paris, France, has recently announced that throughout the whole of Europe there is now a reduction of fully twenty-five per cent., and I am very glad, indeed, to have accepted your kind invitation to attend this meeting to thank you and the members of this Association, for the active part taken in instructing our people, as to the vast importance of the destruction of this house-fly, which is undoubtedly very instrumental in the production of the death rate from tuberculosis.

Dr. Hewitt: We are very pleased to have Sir James Grant with us and I hope that he will attend as many sessions as he can and hear other papers of interest.

INSECTS OF STE. ANNE'S, QUE., SEASON OF 1915.

E. Melville DuPorte, Macdonald College, Que.

During the past season there were outbreaks of several injurious insects at Ste. Anne's and the surrounding country, the most important of which are discussed below.

GRAINS AND CLOVERS.

THE FRIT FLY (*Oscinis carbonaria*) along with the WHEAT STEM MAGGOT (*Meromyza americana*) caused appreciable injury to small grains. These insects which have not, at least within recent years, been destructive in this region were more plentiful than usual.

HESSIAN FLY injury was observed by Mr. P. I. Bryce in the experimental plots at Macdonald College. Hitherto these plots have been free from this pest. As the plots worst affected were in the neighborhood of a manure pile it is practically certain that the insects were brought in with the manure.

The more important insects of the clover during the season were the CLOVER SEED CHALCID (*Bruchophagus funebris*), THE LESSER LEAF WEEVIL (*Phytonomus nigirostris*), THE CLOVER MITE (*Bryobia pratensis*), THE PEA APHIS (*Macrosiphum pisi*), and *Tychius picirostris*. The Seed Chalcid was quite destructive during the seasons of 1913 and 1914. The injury due to it was not so marked during the season under discussion, but its work was supplemented by that of the Lesser Clover-leaf Weevil, the larvæ of which destroyed a fair proportion of the red clover seed. The Clover Mite was quite abundant in the latter part of the season.

LOCUSTS. The locust outbreak was very severe in the Province of Quebec during the past season. Not only forage and field crops, but some garden crops were severely injured. The species most numerous and causing most injury at Ste. Anne's was the red-legged locust (*Melanoplus femur-rubrum*). *M. bivittatus* was also quite numerous. At Macdonald College the poisoned bran mash, Kansas formula, was used to protect the experimental plots. For some reason the mortality among the locusts was not as high as expected. The incursion of locusts from neighboring untreated fields increased the difficulty of controlling the pest and for this reason strong emphasis should be laid on co-operation among farmers in combatting these insects.

FIELD AND GARDEN CROPS.

CUTWORMS. Another very serious outbreak of cutworms occurred in parts of the Province, causing considerable injury to garden and field crops. At Ste. Anne's the species responsible for most of the injury was the striped cutworm (*Euxoa tessellata*), but a few white cutworms and red-backed cutworms were also found. Several parasites of these insects were actively at work, and the relatively small number of moths observed holds out some hope that the cutworms will be less destructive next year.

ROOT MAGGOTS. Both the cabbage root maggot (*Chortophila brassicæ*) and the seed corn maggot (*Chortophila fusciceps*) were the cause of much injury to cruciferous crops. In some turnip fields a large proportion of the plants was destroyed by the seed corn maggot even after the tops were practically full grown and the roots had attained a fair size. The carrot rust fly (*Psila rosæ*) was more injurious than usual this year, causing considerable loss in small kitchen gardens.

THE BEET-LEAF MINER (*Chortophila vicina*) was injurious at Ste. Annes to mangels, beets and spinach. Complaints were received also from other parts of the Province.

THE HOP FLEA-BEETLE (*Psylliodes punctulata*). Beets and mangels were badly attacked by this insect in the early part of the season. It was the only flea-beetle which occurred in very large numbers at Ste. Anne's.

The growing of parsnip seed for the first time at Macdonald College introduced there a new pest, the Parsnip Web-Worm (*Depressaria heracliana*), which greatly reduced the yield of seed. This insect is always present in the wild carrot at Ste. Anne's but has not before given us any trouble.

ORCHARD AND SMALL FRUITS.

THE PLUM SLUG (*Eriocampoides limacina*) was very destructive during 1913 and 1914, and judging by the number of adults which emerged last spring and the number of eggs laid, I expected a severe outbreak this season. The eggs, however, were so effectively parasitized by the chalcid *Pentarthron minutum* that it was not even necessary to spray for the slug.

THE BUDMOTH (*Tmetocera ocellana*) continues to be injurious in various parts of the Province, especially in poorly kept orchards. Its parasites were at work, *Pentarthron minutum* being most active. Experiments on the control of the budmoth larvæ indicated that they could be kept in check by the application of two sprays, one three days before the blossoms open, the other shortly after the petals fall. It was also found that lead arsenate at the rate of 2½ lbs. per 100 gallons of spray, applied at the end of June while the eggs are on the leaf, will destroy a very large proportion of the newly hatched larvæ.

THE CIGAR CASE BEARER (*Coleophora fletcherella*) was present on unsprayed trees but gave no trouble in well kept orchards.

The work of the BUFFALO TREE-HOPPER was very evident in some orchards. In a young orchard of about 4,000 trees, not far from Ste. Anne's, this insect has dwarfed and deformed several of the trees to such an extent that they are practically valueless.

Among the insects injurious to small fruits the more important were the CURRANT SAW FLY, the RASPBERRY SAW FLY, and the imported CURRANT BORER.

THE OCCURRENCE OF TYCHIUS PICIROSTRIS ON CLOVER AT STE. ANNE'S, QUE.

E. MELVILLE DUPORTE, MACDONALD COLLEGE, QUE.

Last May I noticed that the leaves of red clover which forms a cover crop in an orchard at Ste. Anne's were being destroyed by a small snout beetle. This insect was present in large numbers feeding gregariously on the leaves, in many cases upwards of twenty being found on a single leaf. On being disturbed the weevils readily "feigned death" and fell to the ground. Specimens sent to the United States Bureau of Entomology were identified as *Tychius picirostris* by Mr. E. A. Schwarz.

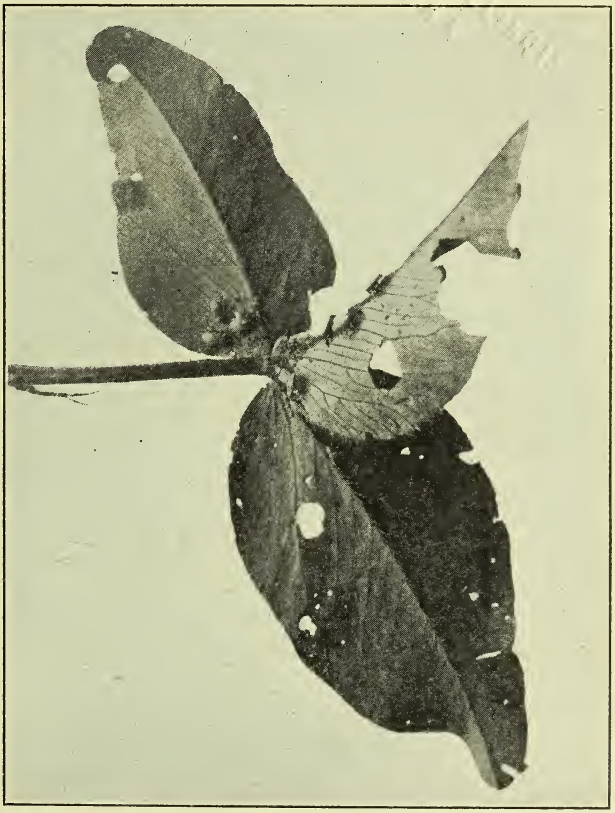
Later in the season, as soon as the clover came into bloom, the insects deserted the leaves and attacked the flower heads in which they remained throughout the season. My latest record is dated September 28th.

The weevil was found in practically all fields of common red and mammoth red clover in the neighborhood of Ste. Anne's, but did not seem to attack other varieties.

The adult beetle is a small curculio about 2.25 mm. long and 1 mm. broad. The interspaces of the elytra are thickly clothed with narrow, hair-like, procumbent scales, the elytral striæ are naked. The ventral side of the body bears somewhat broader scales. Pronotum punctate; not much narrower than the elytra; its length about equal to its greatest breadth; narrowed in front; the scales on the pronotum and also on the legs are similar to those on the elytra. The head is sparsely clothed with fine hairs; the beak is about as long again as the head and clothed at its basal end with scales like those of the elytra.

The scales of the elytra and prothorax give the weevil a pale olive green colour, but they are rubbed off as the insect gets older, leaving the elytra and pronotum bare so that the insect gradually assumes a dark brown colour.

Tychius picirostris is not an indigenous form, but has been introduced from Europe where it attacks the flower heads of red clover, plantain and *Genista.* It has not before been recorded as injurious in North America though I learn from Professor F. M. Webster that it has been collected at Ithaca and Oswego, N. Y., and at Framingham, Mass. I have observed it at Ste. Anne's for several years, but not before in sufficiently large numbers to be regarded as injurious.



Tychius picirostris on clover leaf. (Original.)

The President: Mr. DuPorte is to be congratulated on his account of his season's work, which indicates how very active he has been and to what good purpose he has directed his attention. We here have been particularly interested in his observations on *Tychius picirostris,* this new pest of clover, and probably Mr. Gibson has some remarks to make about this.

Mr. Gibson: We have a specimen in the collection which may possibly be this species and which is from Brockville. We have not, however, examined it carefully enough to be certain. I was glad to hear of the eastern occurrence of the Hop Flea-beetle, which Mr. DuPorte referred to.

Prof. Lochhead: I would like to remark in regard to Mr. DuPorte's papers that I had not much time to give to the work done by Mr. DuPorte, who is a member of the Biology staff of Macdonald College as investigator under the Dominion Federal Agricultural Institution Act. He has done a great deal of work of which this is a small fraction, and he has other more elaborate work at hand. It is especially in the line of anatomical work that his investigations are valuable. I know of no person in Canada who is more adept or more patient in the unravelling of minute anatomy than Mr. DuPorte, and we may expect to hear of some of his investigations a little later. He had the honour of presenting a paper to the Royal Society last year, and I feel sure that Mr. DuPorte will favor us year after year with his attendance and give an account of his work.

The President: If there is no further discussion I think we will conclude this morning's session.

THURSDAY, NOVEMBER 4th—AFTERNOON SESSION.

The President: We are to begin the afternoon session with a paper by Dr. Fyles. Dr. Fyles needs no introduction to the Entomological Society. He is the oldest member among us, and when he said last year that the paper he presented would be probably the last I well remember disputing the fact with him, and apparently my own prophecy has proved correct in that we are to enjoy another paper by Dr. Fyles entitled "Observations Upon Some of the Predaceous and Parasitic Hymenoptera."

OBSERVATIONS UPON SOME OF THE PREDACEOUS AND PARASITIC HYMENOPTERA.

Rev. Dr. Fyles, Ottawa.

One day in summer, I was sitting under the verandah of a friend's house, at Hull, when I noticed a specimen of *Pelopœus cementarius* Drury, exploring some webs that had escaped the notice of the mistress of the dwelling. The creature was in search of spiders, wherewith to provision the mud castles that it was building for its young. This incident suggested the subject of my paper.

The question entered my mind, How can I obtain a supply of the mud structures for use in the preparation of the article? I bethought me that boys are privileged, and can go where older persons cannot, without being regarded as intruders, so I asked the aid of one of Baden Powell's boy scouts, and not in vain; for next day he obtained for me an ample supply of the castles, from an unused attic of a neighboring house.

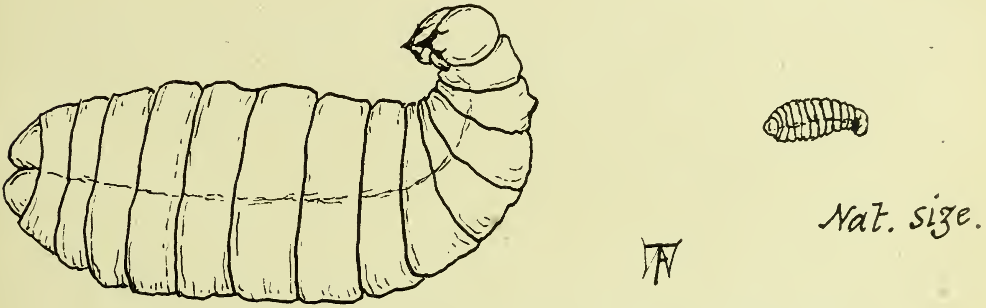
Pelopœus cementarius has practised the business of pottery from the creation of the world that now is. Its instinct impels and guides it, and its work is accurately done, according to its need.

I have watched the insect preparing material for its building.

In the grounds of the late Mr. Quartus Bliss, at Compton, in the eastern townships, there was a horse-trough hewn out of a huge basswood log. The water was supplied by a spring, and its overflow escaped at one end of the trough, through a circular cut, and formed a puddle in the clay ground. One day, when on a visit to Mr. Bliss, I saw a number of mud-wasps at this puddle gathering soil, tempering it with their mandibles, and then flying away with pellets of the cement.

The cells brought to me were in masses, and probably numbered two hundred. They reminded me of dirty peanuts jammed together. Within each was a long oval chamber, at one end of which were the remains of the spiders on which the inmate had fed. Next to these was a hard cap, rough and rounded on the outside, and concave and polished on the inside. Attached to this was a case, yielding to the touch, and somewhat brittle, but strengthened by a fine silken covering, which I found could be peeled off.

The case was semi-transparent. The form of the waxen larva, free and unattached, could be seen through it. Examined through a glass it appeared to be formed of a like silken texture as its covering, but smoothed and compacted by a vehicle that resembled glue or varnish.



Grub of *Pelopœus cementarius* (Drury) in the month of November.

As the case was complete, and the remains of the spiders on the outside of it, its occupant must have ceased to feed.

The perfect Pelopæus is a grim object, very active, very forbidding. Its "frightfulness" is its protection. It seems to say, "You let me alone, and I'll let you alone." In reality it is one of our insect friends.

I think three spiders for each would be a low estimate for the provision made in the cells brought to me. That would give 600 spiders collected in the immediate vicinity of the house in which the cells were found. Now, when you call to mind how prolific the female spider is, you will be able to form a faint idea of the terrible and disgusting plague from which the mud-wasps preserve us.

But the spiders have their use in the economy of nature. Are there no counter checks against the undue increase of the mud-wasps? Yes, several ichneumon-flies have been recorded as preying upon them: for instance, *Cryptus junceus* Cresson (Am. Ent., Vol. I, p. 137).

Some years ago, I had a batch of Pelopæus cells in my study window. One day, when the wasps were breaking from their domiciles, I found a specimen of *Sarcophaga prœdator* Zabriski in the window. I can only account for its presence by supposing that it came from one of the mud cells. If my surmise is right, how can we account for the presence of intruders such as this in the mud castles of the wasp? I think that Prof. W. S. Blatchley, in "Woodland Idyls," pages 206-9, has supplied an answer. He tells that he saw an ichneumon light upon a spider, *that a wasp was carrying off,* and deposit an egg in it.

Zabriski found *S. prædator* in the nests of *Vespa maculata* Linn., and *Vespa germanica* Fabr., insects of widely different nesting habits. Has it a wider choice of domiciles? It may have.

The Digger Wasps should be numbered among our insect friends.

One summer day, a few years ago, I was walking in the beautiful cemetery at St. Joseph de Levis when I came to a bare and unused portion of ground. The soil was light yet not friable. It seemed to be just suitable for the operations of *Bembex fasciatus* Fab. About a score of these insects were in sight, some of them sinking shafts in the ground; others storing their shafts already completed with Blue-bottle flies.

It must be told here that a considerable tract of Government land lies near the burial ground which I have spoken of; and that some of the dwellers in the vicinity were guilty of the reprehensible practice of carting their garbage out to this waste land, and leaving it there uncovered. It was not surprising that Blow-flies were plentiful in the neighborhood, and that Digger Wasps and Carrion Bettles were plentiful there, too.

I once saw *Ammophila communis* Cresson, staggering along with a caterpillar larger than itself, and then burying it in a hole previously prepared.

The monarch of our Canadian ichneumons is undoubtedly *Thalessa atrata* Fab.

On the 17th of June, 1899, the Quebec Branch of the Entomological Society, which was then in a flourishing condition, held a field day in the grounds of Mr. Harper Wade, of New Liverpool, Quebec. Mr. Wade's house is on a bluff overlooking the St. Lawrence. Behind it is an extensive lawn bordered by ornamental trees and shrubs. At the time of our visit a huge maple log had been sawn into blocks of stove length, ready for the splitting; but the owner had placed them here and there, under the trees, for rustic seats. On approaching one of these I found several female specimens of *atrata* in the act of depositing their eggs, while others of the species were darting about in the vicinity. Each block had its visitors of the kind attracted by the larvæ of *Tremex columba* Linn., which were tunneling in the wood. But how were the ichneumons attracted? Was it by some subtile emanation from their victims? Who can say?

There are trees on each side of the street on which I live. A Red Maple (*Acer rubrum*) is growing a few yards from my door. On the 16th of June, 1912, looking from the portico over this door, I saw an assembly of ten or a dozen males of *Thalessa lunator* Fabr. The insects were clustered on a spot where a limb of the tree had been lopt some years before.

There was apparently much agitation amongst them. Before night two females made their appearance from the wood; and then the males dwindled in number. Only the two females remained next day.

What attracted the male insects to the spot where the females were about to show themselves? Was it scent, or sound, or some influence we know not of?

While speaking of the Longtails let me say that some years ago, I took on the Heights of Levis a Thalessa of great rarity. It is about the size, and of the same rich sienna-colour as *Thalessa lunator* Fabr., but very different in its markings. Instead of the lunettes which are seen on the abdomen of *lunator,* there are, on each side of the 3rd, 4th and 5th abdominal segments of the insect I am speaking of, a bright crome-yellow circle upon a black fascia which passes round the segment. I presume that this insect is *Thalessa nortoni* Cresson.

Epialthes gigas Walsh, which closely follows the above in our lists, has a forbidding appearance. Epialthes (Gr.) means a *nightmare, one that leaps upon you.* Not a bad name! Decidedly it is better to have the insect preserved in the cabinet than alive in the bed-chamber.

I have in my collection, amongst many other useful insects, representatives of twenty-two species of the genus *Ichneumon.* They attack the Noctuids. I have seen *Ichneumon lœtus* Brullé break from the emptied skin of a cut-worm.

The micro-hymenoptera are valuable friends to man. I have here a family of 103 specimens of *Apanteles longicornis* Provancher, which fed in one Tussock caterpillar, and then spun their cocoons around the remainder of their victim.

To show how thoroughly the work of the micro-hymenopterous parasites is done, and how important it is, in sometimes un-noted directions:

Those who have stood on a Quebec wharf in the blueberry season, and seen the Saguenay steamboats discharging their freight, will have noticed the stacks of rude boxes, made of slabs from the sawmills, and filled with blueberries, landed there; and they will have witnessed the eagerness with which dealers have made bids for them. The reflection will have come into their minds, what an important source of revenue—what a provision of food—the blueberry crop must prove, to the poor inhabitants of the Chicoutimi and Saguenay wilds, and how serious a loss to them its failure would be.

In May, 1895, I sent to Mr. Wm. H. Ashmead, a number of galls that I had found on the blueberry bushes at Levis, and specimens of the flies that I had raised from them. Mr. Ashmead replied:

"The gall on Vaccinium is my *Solenozopheria vaccinii* described in 1887 (Trans. Am. Ent. Soc. XIV, p. 149).

"The parasite reared from it is my *Megorismus nubilipennis.* The gall occurs abundantly on various species of Vaccinium, in all parts of the country, but the maker is extremely rare; and the only one known, so far as I know, is my single type specimen. I took the gall by the hundreds, and have never reared but one specimen of the gall-maker; all other things reared from it being parasites. I have reared several distinct species of micro-hymenoptera from it, although of these the *M. nubilipennis* was the most common."

One of the most brilliant little micro-hymenoptera came under my notice in peculiar circumstances, and has remained a memory and a mystery to me to this day. The late Mr. Joshua Thompson, of D'Aubigny Villa, Levis, sent to me one day in July, begging me to come and see his plum trees. The trees were loaded with half-grown fruit; and a most remarkable invasion of the trees had occurred. I never witnessed anything like it. There were myriads of tiny hymenopterons upon them. I counted as many as thirty on one plum. The females of the species had their ovipositors thrust deep into the fruit.

I submitted specimens of the insects to Mr. Ashmead and he declared them to belong to a new species. I named them *Torymus thompsoni,* and I published a full description of them in the Thirty-fourth Ann. Rep. of the Ent. Soc. of Ont., page 10. The type of the species is in my collection in Ottawa.

I had previously raised specimens of *Torymus sackenii* Ashmead, from blisters on the leaves of Golden Rod.

In the valuable series of Farmers' Bulletins issued by the Bureau of Entomology, at Washington, there appeared lately an article by Mr. F. M. Webster, which reminded us of a time when the hearts of men began to fail them for fear because of the devastations wrought in their grain fields by the Hessian Fly. Where this insect comes in its strength—to use the words of Mr. Webster—

"hundreds of thousands of acres of wheat may be either totally, or so badly injured as to reduce the yield 50 to 75 per cent., and the monetary losses expressed in dollars would run far up into the millions."

Agriculturists, at the time I have alluded to, were at their wits' end to discover checks upon the destroyers. The checks came, but they were not of man's devising. Doubtless, in the beginning of the world that now is, such interruptions and disturbances in the order of nature, as the Hessian Fly plague—

> "Deep in God's foreknowledge lay."

And it was He who brought to bear the minute antagonists of the fly, that are so well figured in the bulletin I have mentioned, viz.: *Polignotus hiemalis, Merisus destructor, Platygaster herrickii, Bœotomus subapterus.*

A bulletin on the Hessian Fly has also been written by Mr. Norman Criddle, and published by direction of the Minister of Agriculture, Ottawa. In it a full description of the pest, its life-history, and its operations are given. A reference to its hymenopterous parasites is also made.

Such investigations as Mr. Webster and Mr. Criddle, and others of our practical Entomologists, are carrying on, dignify our favorite study, and raise it far above trivialities and hobbies. In following out the life-histories of our insect friends and insect foes, and showing how wonderfully they work for the general good, they—

> "Justify the ways of God to man."

In pointing out the best methods of operating under the vicissitudes of nature, of remedying evils, and advancing benefits, their work is ennobled, for the are "workers together with God."

HYMENOPTERA PARASITICA—ICHNEUMONIDÆ TAKEN IN THE PROVINCE OF QUEBEC BY THE REV. DR. FYLES.

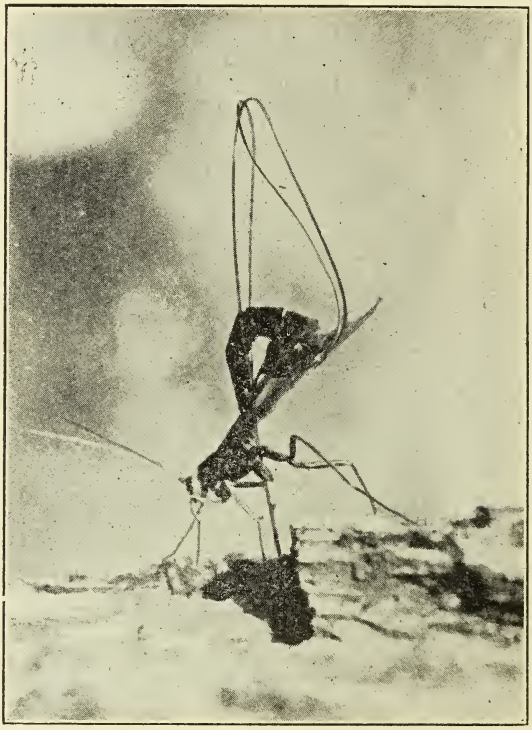
ICHNEUMONIDÆ.

Ichneumon annulipes Cresson. Levis, rare.
Ichneumon canadensis Cresson. Levis, common.
Ichneumon cincticornis Cresson. Levis, common.
Ichneumon comes Cresson. Levis, common.
Ichneumon creperus Cresson. Levis, common.
Ichneumon extrematus Cresson. Levis, rare.
Ichneumon flavicornis Cresson. Levis, common.
Ichneumon flavizonatus Cresson. Levis, common.
Ichneumon grandis Brullé. Levis.
Ichneumon insolens Cresson. Levis.
Ichneumon jucundus Brullé. Levis, rare.
Ichneumon lœtus Brullé. Levis, common.
Ichneumon malacus Say. Levis, rare.
Ichneumon paratus Say. Levis, rare.
Ichneumon pictifrons Cresson. Levis.
Ichneumon promptus Cresson. Levis, rare.
Ichneumon rufiventris Brullé. Levis, rare.
Ichneumon sublatus Cresson. Levis, common.
Ichneumon unifasciatorius Say. Levis, common.
Ichneumon versabilis Cresson. Levis, common.
Ichneumon wilsoni Cresson. Levis, rare.
Ichneumon xanthropus Ashmead. Levis, rare.
Amblyteles indistinctus Provancher. Levis, rare.
Amblyteles quebecensis Provancher. Levis, rare.
Amblyteles rufizonatus Cresson. Levis, rare.
Amblyteles subrufus Cresson. Levis, common.
Amblyteles saturalis Say. Levis, rare.
Trogus brullei Cresson. Levis, common.

Trogus copei Cresson. Levis, common.
Trogus exesorius Brullé. Levis, common.
Trogus fulvipes Cresson. Levis.
Herpestomus hebrus Cresson. Levis, rare.
Trychosis tunicula-rubra Fyles. Levis.
Cryptus americanus Cresson. Levis, rare.
Cryptus extrematis Cresson. Levis, parasitic in *Samia cecropia.*
Cryptus robustus Cresson. Levis, rare.
Hemiteles mucronatus Provancher. Levis, parasite of *Tricotaphe levisella* Fyles.
Hemiteles utilis Norton. Levis, secondary parasite in Acronycta larvæ.
Ophion macrurum Linneus. Levis, parasitic in the Saturnians.
Ophion purgatum Say. Levis, common.
Exochilum fuscipenne Norton. Levis, common.
Exochilum mundum Say. Levis, common.
Heteropelma flavicornis Brullé. Levis, common.
Opheltes glaucopterus Linneus. Levis, parasitic in *Cimbex americana.*
Paniscus geminatus Say. Levis, common.
Campoplex glaucus Norton. Levis, rare.
Campoplex laticinctus Cresson. Levis, rare.
Exetastes rufofemoratus Provancher. Levis, common.
Exetastes suaveolens Walsh. Levis, rare.
Sphecophorus prœdator Zabriskie. Hull parasitic in nests of Vespa.
Polyblastus quebecensis Provancher. Levis.
Exyston humeralis Davis. Levis, rare.
Bassus tripicticrus Walsh. Levis, rare.
Arotes amœnus Cresson. Levis.
Arotes vicinus Cresson. Iron Hill.
Thalessa atrata Fabricius. New Liverpool.
Thalessa lunator Fabricius. Sherbrooke, common.
Thalessa nortoni Cresson. Levis, very rare.
Ephialtes gigas Walsh. Levis.
Pimpla annulicornis Cresson. Levis, rare.
Pimpla conquisitor Say. Levis, common.
Pimpla inquisitor Say. Levis, parasitic on *Hylotoma pectoralis.*
Pimpla pedalis Cresson. Levis, common.
Pimpla pterelas Say. Levis.
Pimpla tenuicornis Cresson. Levis, rare.
Lampronota americana Cresson. Levis, common.
Lampronota punctulata Cresson. Levis, rare.
Lampronota varia Cresson. Levis, rare.
Xytonomus stigmapterus Say. Levis.
Echthrus abdominalis Cresson. Levis.

The President: Dr. Fyles, I should like to express on my own behalf and on behalf of the members here our great appreciation of your address, especially your peroration and your tribute to those practical entomologists who, in their work, are rather apt to forget that aesthetic and beautiful side of entomology which you so well express, not only in this but in your previous papers. Your reference from time to time of discoveries you made fifty years ago make so many of us here feel how really very young we are, and how much we have to learn from our predecessors in entomological investigation and study. I have always felt, sir, that the papers and addresses which you have given from time to time are most valuable to us particularly as exponents of good English. I feel that in the hurried life we lead and the desire that some workers have to get their information quickly into print, there is a tendency to neglect the form and style of our English, which, of course, as English-speaking people, we should do everything we can to prevent, and, therefore, for an additional reason your addresses are more valuable and of practical use to us as examples of the use to which English can be put. I will not detain the meeting any longer, because there may be other members who would like to say a few words of appreciation.

Prof. Lochhead: Mr. President, may I say a few words in addition to what our Chairman has said regarding the long services of Dr. Fyles in connection with work in entomology? I have known Dr. Fyles for over twenty years; I am sorry I have not known him longer, for I might have been a better man. About twenty years ago I came into contact with a small number of men older than myself, I might say a generation older—Dr. Fyles, Dr. Bethune and Dr. Fletcher, a little younger than these two. I met them all at the Annual Meeting in London, in 1895 or 1896. These men, I think you will all have observed, have given great attention to the literary form in which they express themselves. I have said very frequently in reading over their papers (take the old Entomological Society Reports of Dr. Bethune or Dr. Fletcher, for example) that they were masters of English, and we are not keeping up to the standard they set in this respect. I agree with our Chairman that more attention should be given to the form in which our reports and papers are prepared. This is not the first paper I have heard from Dr. Fyles during all that time, for he has seldom been absent from the meetings. Then in addition, we have had him several times in attendance at our meetings of the Quebec Society for the Protection of Plants at Macdonald College. While Dr. Fyles is a strong member of the Ontario Entomolgical Society, yet I think his heart is in Quebec, where he has laboured so long. While he cannot come down to our meetings as he used to, yet we always feel that his heart is with us, and his mind and thoughts are with us at our Annual Meetings. I hope he will be able to come down for the next meeting. I rise simply to show my appreciation of the valuable work that Dr. Fyles has done in connection with the Society.



Megarhyssa atrata ovipositing on maple, approximately natural size. Photograph by Charles Macnamara, Arnprior, Ont.

THE PRESIDENT: I wish to make a slight alteration in the programme because of the circumstances. We have with us a gentleman from Arnprior, Mr. Macnamara, who is rapidly becoming an entomologist—in fact I think he is already an entomologist. He has been making some very interesting observations on certain insects to which Dr. Fyles referred, namely, those extraordinary hymenopterous parasites of the genus *Thalessa.* Mr. Macnamara, in addition to being an entomologist, is also a photographer of considerable skill, and has been able to apply his photographic knowledge to the recording of the oviposition of those extraordinary parasites, some of the most extraordinary parasites we have, and, therefore, I think it is rather fitting that, although I took upon myself to ask Mr. Macnamara to read this paper and it is, therefore, not in the programme as the latter had already been prepared, Mr. Macnamara should give us a brief discussion on his observations of which he has some photographs.

MR. MACNAMARA: You have taken me entirely by surprise, Dr. Hewitt, and I do not think I have much of interest to say, but I have a few photographs of one of the ichneumons that the members may care to see. The prints show the male and female *Thalessa,* or as the genus is now called, *"Megarhyssa" atrata;* and the female alone with her extraordinary ovipositor separated to show the two sheathes and the drill. Other prints show the tree infested with Tremex which the *M. atrata* frequented, and magnified views of the ovipositor, foot and other parts are given. Perhaps the most interesting views are those of the insect in the act of ovipositing, with the flexible sheathes curved over her back.

I first observed these insects ovipositing on a maple tree in a small hardwood grove about the middle of June. They were in considerable numbers, some days twenty to twenty-five, and continued egg-laying until the middle of September when they disappeared. As their victim, the Tremex never seems to attack perfectly sound wood, *Megarhyssa* generally bores into somewhat decayed material, but it is wonderful that she should be able to drive her ovipositor as she does, to a depth of five or six inches into wood that we find hard enough to cut with a chisel or a knife.

Dr. Fyles spoke of the instinct which enables them to discover the tree tunnelled by the Tremex. Their instinct in this respect is remarkable, but by no means infallible. The *Megarhyssa* I observed frequently only on one tree in a grove of five or six acres, and frequent and careful search failed to discover them on any other tree in the wood. But in October a large maple nearby, broken off by a gale, was found to be riddled by Tremex and no *Megarhyssa* had ever discovered them.

As Dr. Hewitt has taken me entirely by surprise I hope you will excuse the crudeness of my remarks, as I have not had time to prepare anything, but probably the photographs will prove interesting to some of you.

THE PRESIDENT: I think the photographs which are going around will prove my statement that we have with us a photographer-turned entomologist, and those of you who remember Mr. Macnamara's previous contributions to entomology in the shape of his account of the habits and some notes on the biology of those very small, little-studied creatures, *Achorutes,* will agree with me that we have a very ardent entomologist in Mr. Macnamara, and I do not think that he will need any further introduction or words to back up his election for membership when his name comes forward, as it will to-morrow.

PROF. CAESAR: This photograph of Mr. Macnamara's, showing ovipositing is extremely good. It is a most wonderful thing to look at this insect ovipositing.

Time after time I have watched it and tried to get a photograph, but failed at the last moment. Might I ask that this photograph be published?

THE PRESIDENT: I agree with Professor Caesar that the publication of that photograph would be most useful.

We will now proceed to the programme. The next paper is that by Mr. Parrott and Dr. Glasgow on "The Leaf Weevil (*Polydrosus impressifrons* Gyll.) in New York."

THE LEAF-WEEVIL (*Polydrusus** *impressifrons* Gyll.) IN NEW YORK.

P. J. PARROTT AND HUGH GLASGOW.

The leaf-weevil which is discussed in this paper is a new and, until the inception of this study, an unrecorded enemy of shade and fruit trees in the United States. In view of the losses sustained by farming interests in America by introduced insects a newly-discovered species of foreign origin, however unimportant it is in its original home, is the subject of considerable speculation as well as of some apprehension until its status as a pest is definitely determined. The following notes represent a preliminary account of our studies upon the weevil, which are perhaps not without interest to those who are especially concerned in matters dealing with the introduction and spread of noxious insects.

DISCOVERY AND IDENTIFICATION OF SPECIES.

Our attention was first attracted to this species during the summer of 1906 when large numbers of the beetles were observed in young plantings of willows and poplars in the vicinity of Geneva. They were present on nearly every tree and were feeding on the margins of the more succulent leaves. Some days later specimens of the insect were sent to us by the foreman of a nursery in another part of Ontario County, N.Y., who reported that the beetles were injuring roses and apples. As the species was apparently not represented in entomological collections in this country and it was difficult to secure positive identification, specimens of the insects were forwarded to Professor Alfred Giard, The Sorbonne, Paris, and to Doctor G. Horvath, The Hungarian National Museum, Budapest, both of whom independently classified the beetle as *Polydrusus impressifrons* Gyll.

STATUS OF THE SPECIES IN EUROPE.

In view of the great numbers of the beetle in certain sections of New York, a perusal of European literature impresses strongly two points on the mind of the reader: (1) The weevil belongs to a group of insects which contain some species that are destructive, and (2) the species *impressifrons* is of little significance; and there apparently very little knowledge, if any, as regards its life history and habits—deficiencies which hold equally for some associated species that are of considerable importance, and therefore better known, at least by name. Notwithstanding the seeming lack of detailed data on life histories and habits, the weevils attacking buds and tender foliage of fruit and shade trees appear to be more injurious and varied as regards number of species in Europe than is the case in this country. From the standpoint of economic status, two Otiorhynchid genera are at this time of special interest—*Phyllobius* and *Polydrusus,* which comprise a number of species of weevils that range from various shades of brown to bluish-green or golden yellow in colour. Several of these are listed as noxious insects because of their habit of nibbling young opening buds and then later attacking the foliage. With plants of horticultural importance as hosts some species also do considerable harm by gnawing the parts of the blossoms and thus preventing fructification. According to Zimmerman[1] the species of these genera are very similar in appearance and the two groups are distinguished by the character of the antennal groove. In his discussion he, however, treats the different species as a whole, considering in the following order *Phyllobius argentatus* L., *Phyl. maculicornis, Polydrusus sericeus* Schall, *Phyl. pyri,* L., *Poly. mollis* Stroem., *Phyl. oblongus* L., and *Phyl. viridicollis* Fabr. Aside from merely mentioning the names of the foregoing species and calling attention to errors in the writings of other authors, very little information is given as to the life histories and bionomics of the insects. It is to be noted also that *impressifrons* is not listed, an omission which would indicate that it was not of sufficient importance to be considered in an economic treatise. Judeich[2] and Nitsche mention nine species of the genus *Phyllobius* and two species of the genus *Polydrusus,* and make no reference to *impressifrons.* The also call attention to the lack of knowledge upon the different insects of the two groups. Die[3] Tierischen Feinde by Reh, which is one of the latest economic works on European insects, contains a brief account of a number of species in the genus *Phyllobius,* and states that of the numerous species in the genus *Polydrusus* only a few are so abundant as to be destructive. Four species are mentioned, but there is no reference to *impressifrons.* While Nördlinger,[4] Kaltenbach[5] and Hess[6] discuss other species in either of the two genera, none of these authors refer to the insect under discussion. In Fauna Austrica, Redtenbacher[7] gives a brief description of *impressifrons,* and states its habitat is North Germany. Jäger[8] gives its distribution as Germany and France. In 1888[9] Schilsky listed the species and states that it is plentiful throughout Germany. Turning now to England, Rye[10] in his work on Brtish Beetles lists a good number of species of the genera *Phyllobius* and *Polydrusus,* in which *impressifrons* is not definitely included. Theobald[11] in his Insect Pests of Fruit makes no reference to any species of *Polydrusus,* but discusses with some detail several Phyllobius species as *Phyl. calcaratus, maculicornis, oblongus* and *uniformis.* He states that various leaf weevils are found on all kinds of vegetation and that several species are common to not only many kinds of fruit but also to various forest trees and shrubs. Two species more prominent than others on fruit trees and bushes are the Green Leaf Weevil (*Phyl. maculicornis*) and the Oblong Leaf Weevil (*Phyl. oblongus*). The Glaucous Leaf Weevil (*Phyl. calcaratus*) is also mentioned as doing serious damage to black currant bushes. It usually occurs on alders and various low bushes and hedges. With respect to *impressifrons* Professor Theobald informed the senior author in 1914 that he was not familiar with it and no specimens were contained in his museum collections. As the species seemed to be more numerous in France, Austria and Germany, and desiring to know more of its present status as an injurious insect, a circular letter soliciting information on the creature was sent to a goodly number of European entomologists. The importance of the species can be judged from excerpts from two letters, one from France and one from Austria. A. Giard[12] writes that while *impressifrons* is by no means rare in the spring upon willow and alder, it is not an important species, and little is known regarding its ethology. Zimmerman[13] states that the insect is not very common in Austria or Germany and occurs on willow and alder. Injuries to the foliage of fruit trees have not so far been recorded. Little knowledge exists as to its life history and habits.

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*This genus is also designated *Polydrosus*, but W. D. Pierce of the U. S. Bureau of Entomology has kindly informed us that the foregoing designation is, according to the rules of nomenclature, to be preferred.

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[1] Zimmerman, Hugo, Die Obstbauschädlinge aus der Familie der Rüsselkäfer.
[2] Judeich, J. F., and Nitsche, H., Forstinsektenkunde, Bd. I, pp. 407-411.
[3] Reh, L., Handbuch der Pflanzenkrankheiten, Bd. 3, p. 539, 1913.
[4] Nördlinger, H., Die kleinen Feinde der Landwirthschaft, 1855.
[5] Kaltenbach, J. H., Die Pflanzenfeinde, 1874.
[6] Hess, W., Die Feinde des Obstbaues, 1892.
[7] Redtenbacher, Ludwig, Fauna Austrica, Die Käfer, Wien, 1858.
[8] Jäger, G., Käferbuch (C. G. Calwer), p. 420.
[9] Schilsky, J., Systematisches Verzeichnis der Käfer Deutschlands, 1888.
[10] Rye, Edward C., British Beetles, 1886.
[11] Theobald, F. V., Insect Pests of Fruit, 1909.

Distribution in New York.

The actual range of distribution of the beetle in the State of New York has not been determined. The insect has become established in Ontario, Monroe and Wayne counties, and scattering numbers of the species have been captured as far west as Albion, in Orleans county. It is not improbable that the species occurs over a larger territory than has been indicated.

Food Plants.

The beetle is apparently an omnivorous feeder, subsisting on the foliage of a large number of plants, among which there may be listed birch, willow, poplar, apple and pear as its favorite plants. Scattering individuals have been collected at various times on elm, rose, linden and black locust, which seemingly were feeding on these plants, although their presence on them may have been accidental and due to the close proximity of more attractive plants. While specimens of the beetles, either actively engaged in feeding or in copulation have been observed on all of the above plants, it should be noted that none or very few of the insects have been seen on maple, box elder, horse chestnut, lilac, syringa or elderberry, although these were growing in considerable numbers near the preferred hosts.

To determine more closely the preferences of *impressifrons,* beatings were made of different plants, and from the collections obtained it appears that the insects seek birches, willows and poplars in the greatest numbers, and, if the beetle manifests any choice among these, preference is given to birches. In feeding tests in breeding cages the creatures subsisted on the foliage of these plants as well as of pear with no apparent choice, and selected the foliage of the foregoing trees in preference to that of the apple.

Siftings of earth showed that the insect breeds in large numbers on such varieties as the Pussy Willow (*Salix discolor*), the Kilmarnock Willow (*Salix pendula*), the Laurel-Leaf Willow (*Salix petandra*), the Weeping Willow (*Salix babylonica*), the Wisconsin Willow (*Salix dolorosa*), and the White Willow (*Salix alba*). Larvæ in great abundance were similarly obtained in soil about two species of birch (*Betula populifolia* and *alba*) and the Carolina and Lombardy poplars (*Populus deltoides,* var. *carolinensis* and *P. nigra,* var. *italica*).

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[12] Giard, A., Letter of July 7, 1906.

[13] Zimmerman, W., Letter of Aug. 7, 1910.

CHARACTER OF INJURY.

As is the case with many associated species in Europe, the damage that *impressifrons* causes is two-fold: First, it nibbles the unfolding buds and then it attacks the foliage, preferring the margins of the leaves. The beetles, while small in size, are voracious eaters, and the extent of their injury is, broadly speaking, in proportion to their abundance. Many of them confined to a relatively small feeding area may cause much harm. The numbers of the insect that one may sometimes observe would suggest at once that they must be doing appreciable damage. However, it should be recorded that generally the extent of injury seems to be greatly disproportionate to the numbers of the creatures. The most conspicuous example of their destructive capacity was observed in 1912 in a large block of willows in a nursery plantation. This was largely composed of the goat willow (*Salix caprea*) grafted to such sorts as New American, Rosemary and Kilmarnock. The latter variety particularly suffered severely as a great many of the insects attacked the opening buds, so that a goodly percentage of them were killed while those partially injured produced imperfect clusters of leaves. The initial injuries were later aggravated by the feeding of the beetles on the margins of the leaves. The effect of this latter attack is to cause the leaves to have an uneven outline, and in instances of extreme injury to present a ragged appearance. So abundant has the insect become in the certain nurseries that the owners have found it necessary to resort to spraying in order to protect their willow plantings. So far we have observed no injuries by the beetle to buds of poplar, birch, apple or pear, and while feeding to an important extent has not been detected on these trees, an examination of them during June will seldom fail to find the work of the insect on the margins of the leaves. At present *impressifrons* derives it importance as a pest from its destructive work in nurseries. In some plantings where it has become established it is very numerous and will hardly fail to attract the attention of an ordinary observer. There is no other species of snout-beetle that, during its active period, so frequently brings itself to your notice. It is not an uncommon experience to carry the beetles on one's clothes into the home or to observe them on the window screens of buildings. The foreman of one well-known nursery has informed us that aside from the damage sustained the beetles have become so abundant in plantings of poplar, birch and willow that they are a source of great annoyance to laborers by flying in their faces. The abundance of the insect is indicated by the following counts: From a sample of earth about osier willow two feet square and to the depth of the spade, ninety-two larvæ were collected. From three spadefuls of earth taken near the base of different kinds of nursery trees the following numbers of larvæ respectively were found: Carolina poplar, 27 specimens; Lombardy poplar, 12 specimens; silver-leaf poplar, 12 specimens; birch, 25 specimens; willow, 19 specimens; American mountain-ash, 17 specimens; European mountain-ash, 1 specimen; apple, old tree in sod, 1 specimen. A similar quantity of earth, three spadefuls, taken about five-year-old fruit trees in a mixed planting yielded the following numbers of insects respectively: apple, 65 specimens; pear, 51 specimens; peach, 35 specimens, and plum 62 specimens. One corner of this orchard was only a little removed from a row of osier willow. The fact that *impressifrons* is apparently of little significance abroad certainly does not warrant the conclusion that it will prove of no importance in this country. The conditions described justify the inference that the species is already more abundant and injurious here than in Europe or more attention would surely have been devoted to it there.

LIFE HISTORY AND HABITS.

The beetles emerge from the ground during the latter part of May and early June. In 1914, they were first detected on May 26, and during the next few days they were mating freely on the foliage. By May 30, eggs were being deposited. For the reception of the eggs the insect seeks cracks or crevices in the bark, such as spaces that occur when the bark is loose at stubbed ends of twigs or branches. Loosened bud scales on twigs or wood, which have been removed by pruning and allowed to remain on the ground, are also sought by the creatures for the deposition of eggs. They appear to select any dry cavity in which the eggs may be inserted, and which occupy positions that are exposed to the sunlight. Eggs have been observed in situations on trees that were ten feet from the ground, and doubtless they will be found in higher positions. The egg measures about .2 mm. in width and .5 mm. in length. It is white, cylindrical and gently rounded at the ends. Its shape seems to be influenced by the accommodation of the egg to surrounding surfaces. Eggs occur singly or in masses, but usually in groups containing from twenty to eighty-five of them. Oviposition is most active during early June. The period of incubation averaged between twelve and thirteen days with little variation under ordinary conditions. Upon hatching the young larva wriggles out of its position of concealment in the bark and falls to the ground. It then seeks a crack in the earth, when it quickly disappears. The larvæ apparently feed on tender roots, and our observations indicate that they can live exclusively on the roots of willow, poplar and birch. Doubtless they find subsistence on the root systems of other trees. It has not been determined that they can live on the subterranean parts of grasses or weeds which may be growing about the foregoing plants. The larvæ transform to pupæ during the latter part of April and early May. The pupal cells are considerably larger than the larvæ and are at an average depth of about two inches, although some of them may be three inches in the soil.

METHODS OF CONTROL.

The beetles are quite susceptible to arsenical poisons, and should it become necessary to combat them little or no modification will probably be required in existing spraying practices. Cultivation, if done with care and at the proper time, would doubtless prove very destructive to both larvæ and pupæ in the soil.

THE PRESIDENT: The State of New York certainly is a general stamping ground for new pests. We have the *Hyponomeuta,* and now we have this other *Polydrusus* which evidently by its abundance seems to be firmly established in that State. I do not remember whether you mentioned in the paper any suggestion as to how it came in.

DR. GLASGOW: We cannot say with certainty, but probably in earth about the roots of nursery stock. This is the only way apparently that it could get in.

MR. BURGESS: I would like to ask Dr. Glasgow what success he has had in its control.

DR. GLASGOW: It is very readily controlled by arsenical poisons.

MR. BURGESS: Do you use arsenate of lead?

DR. GLASGOW: Yes.

MR. BURGESS: At what strength do you use it?

DR. GLASGOW: Commonly at the rate of three or four pounds of the poison to fifty gallons of water.

FATHER LEOPOLD: At what time of the year do you use arsenate of lead?

Dr. Glasgow: About the last of May or early in June, or whenever the beetle becomes abundant to warrant treatment.

The President: If there is no further discussion we will proceed to the next paper, which is of great interest, by Professor Brittain, on *"Lygus invitus* and its control in 1915."

THE GREEN APPLE BUG (*Lygus invitus* Say.) IN NOVA SCOTIA.

W. H. Brittain, Provincial Entomologist for Nova Scotia.

History.

For a number of years past certain fruit-growers in the Annapolis Valley have complained of the non-bearing of their Nonpareil trees. These trees would bloom heavily each year, but would never bear anything like a full crop, yielding only a few gnarled apples; or, in many cases, none at all. This trouble was not entirely confined to Nonpareils, but was more pronounced and by far the most common in this variety. Others complained that their pears "grew woody" and were covered with corky, disfiguring scars. This latter trouble was commonly ascribed to lack of iron in the soil, and liberal applications of iron filings were frequently applied to correct this condition. Driving nails or spikes into trees was also practised.

No one appears to have suspected that there was any connection between the apple and pear trouble, or that either was caused by an insect. In June, 1914, the writer visited an orchard consisting of mature Nonpareils, Ribstons, Gravensteins, Golden Russets and several varieties of pears. The owner stated that the Nonpareils had not had a crop for at least six years, and that the trouble was gradually spreading to the other varieties. Furthermore, the pears were so badly affected that a number of them had been cut down. The affected trees were swarming with the green nymphs of *Lygus invitus,* and it took very little observation to show that they were the culprits. Following this, many reports of similar damage to apples and pears were followed up with a like result, and further investigations have only tended to confirm our early observations.

Distribution and Spread.

The pest seems to be well distributed throughout the fruit-growing centres of Nova Scotia, including the counties of Hants, Kings, Annapolis and Digby. It seems to be more widely distributed on the pears than on the apples, the phrase "injury to pears only" occurring with considerable frequency in the reports of the entomological inspectors.

Though experiment has shown that the adults are capable of flying considerable distances, as a matter of fact, the pest spreads only slowly from orchard to orchard. One orchard immediately across the road from a very heavily infested one, showed few signs of injury. The amount of damage to pears does not seem to vary much from year to year, but the injury to apples appears to be on the increase in many localities and spreading from the more susceptible to the less susceptible varieties.

SERIOUSNESS OF THE PEST.

Sufficient has already been written to indicate that this insect is a very serious pest of both the apple and pear, but any estimate of the actual damage done would, of course, be out of the question. However, it is safe to say that it is one of the most serious insect pests of our orchards. In fact, there can be no doubt that in orchards where it has become established, we have no pest to compare with it, either in amount of damage done or in the difficulty of eradication. The pears in certain orchards have for years been so scarred as to be scarcely merchantable, and, in not a few apple orchards, the crop of fruit from susceptible varieties has been greatly reduced or even destroyed. In one orchard visited, only one apple could be found among ten large Nonpareil trees, due entirely to the work of the Green Apple Bug.

HOST PLANTS.

As far as we have determined, the insect only breeds in the apple and pear. It has been found feeding in the adult stage on plums, but has not been known to oviposit in that plant. When shaken from the trees the nymphs have been observed to feed upon couch grass, timothy, red clover, dandelions and other plants growing beneath the tree, but on reaching the adult stage they again seek the apple and pear trees for the purpose of feeding and depositing their eggs.

THE INSECTS.

When the insect first appears it is light yellow in color, but as it develops it becomes green. It somewhat resembles an aphis in appearance and was once described by a farmer as a "new kind of long-legged aphis." Others speak of it as the "horned aphis" on account of its long antennæ. The adult is a small, delicate insect, one quarter of an inch long. It is very pale on first emerging, but later becomes a combination of light and dark brown. In appearance it resembles quite closely the Tarnished Plant Bug (*Lygus pratensis*).

LIFE HISTORY.

The maximum emergence of the nymphs from the egg state coincides with the opening of the blossoms of the Gravenstein apple, but the beginning of the emergence is about five or six days earlier. They continue to hatch until the time the blossom petals fall, when emergence is practically finished. In the season of 1915 the first nymph to emerge was taken on May 24th and the last on June 10, the period of maximum emergence being from June 1st to June 5th. The duration of the first nymphal instar is 5.22 days (average of 52 individuals); of second, 5.43 days (average of 34 individuals); of the third, 6.66 days (average of 34 individuals); of the fourth, 6.77 days (average of 24 individuals); and of the fifth, 6.83 days (average of 12 individuals).

No nymphs were observed during the past summer after July 7th, all having completed their transformations by that date. The length of the adult stage varies greatly, single individuals having been taken in the orchard as late as the first week in October.

The following table gives the details of the life history of twelve individuals, which were reared from the egg to the adult stage:—

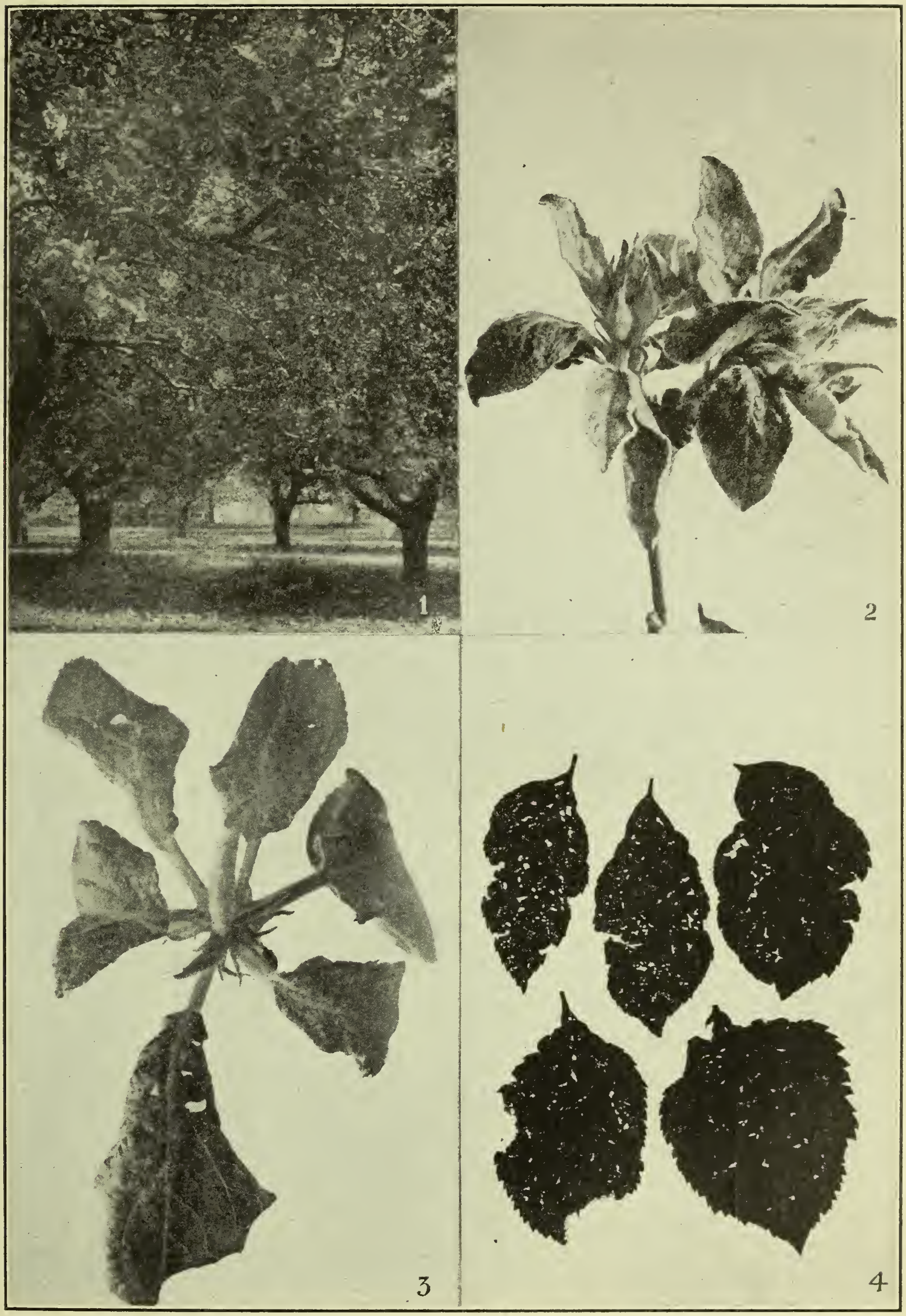

Plate I.—*Lygus invitus.*

Fig. 1.—Orchard heavily infested with Lygus. Note thickness of the trees.

Fig. 2.—State of buds when first bug was found in the spring.

Fig. 3.—Injury to young leaves.

Fig. 4.—Appearance of mature leaves, that have been punctured while young, when held to the light.

LIFE HISTORY OF LYGUS INVITUS IN 1915.

No. of insect.	Date of hatching.	Date of 1st moult.	Date of 2nd moult.	Date of 3rd moult.	Date of 4th moult.	Date of 5th moult.	Date of death.	Number of days spent in each Nymphal instar.						Duration of adult stage.	Total length of life.
								1st instar.	2nd instar.	3rd instar.	4th instar.	5th instar.	Duration of nymphal stage.		
													Days.	Days.	Days.
1......	June 1	June 6	June 13	June 20	June 27	July 4	July 8	5	7	7	7	7	33	4	38
2......	" 2	" 7	" 11	" 18	" 26	" 3	" 4	5	4	7	8	7	31	1	33
5......	" 4	" 8	" 15	" 22	" 29	" 6	" 10	4	7	7	7	7	32	4	36
11......	" 4	" 10	" 16	" 22	" 29	" 6	" 13	6	6	6	7	7	32	7	39
17......	" 2	" 6	" 13	" 20	" 28	" 5	" 10	4	7	7	8	7	31	5	38
19......	" 3	" 8	" 15	" 23	" 30	" 7	" 11	5	7	8	7	7	34	4	38
22......	May 31	" 4	" 10	" 17	" 25	" 2	" 9	4	6	7	8	7	32	7	39
23......	June 2	" 7	" 13	" 20	" 26	" 2	" 8	5	6	7	6	6	30	6	36
27......	" 2	" 7	" 12	" 19	" 26	" 4	" 9	5	5	7	7	8	32	5	37
31......	" 3	" 9	" 16	" 22	" 28	" 5	" 14	6	7	6	6	7	32	9	41
33......	" 1	" 7	" 15	" 21	" 29	" 4	" 12	6	8	6	8	5	33	8	41
34......	" 3	" 9	" 16	" 21	" 28	" 5	" 10	6	7	5	7	7	32	5	37
						Averages		5.08	6.41	6.66	7.16	6.83	32	5.41	37.75

The duration of the nymphal stage in our open air insectary corresponds closely with that in the orchard, as proved by extensive observations, but the life of the adult insect under natural conditions is much longer than the insectary records would seem to indicate. Repeated experiments show that the adults will not thrive in confinement, but keep flying restlessly about, until they die of exhaustion. For the first week or ten days after emerging the adults were abundant in the orchard, but after that they began to die off quite rapidly. It was an easy matter during this time to find a number of dead bugs fastened along the midrib of a single apple leaf. The bugs have a habit, when about to die, of extruding the caudal extremity of the alimentary canal, which is covered by a viscid secretion, by means of which they attach themselves to the leaf.

Though large numbers of bugs died during the latter part of July, there was no difficulty in finding specimens through the month of August and early September. After that individual specimens could only be located with difficulty. On August 27th 50 adults were collected, 46 being females and four males; on August 30th, 50 more were collected, 45 females and five males; on September 3rd, collected 31 specimens, 27 females and four males; September 9th, 10 insects collected, all females, September 13th, 10 more specimens, all females, and on September 17th only two adult females could be found. From that date until October 7th scattering female specimens have been taken.

OVIPOSITION.

The eggs are laid beneath the tender bark of pears and apples, principally the latter. All attempts to catch the female in the act of oviposition were fruitless, though many hundreds of females were brought into the laboratory and placed on apple and pear limbs, or upon apple seedlings beneath jars or wire frames. In no case was the female observed to oviposit, but after flying around for a few days dropped to the ground and died. Neither were we able to make any observations on this point in the orchard, owing to the extreme shyness of the adult insect, and to the almost continuous wet weather that prevailed at that time. Eggs were found beneath the bark on July 20th and several times subsequent to that date, which agreed in every respect with those dissected from the female insect.

H. H. Knight,* who observed one female of *Lygus invitus* in the act of oviposition, writes of it in these words:—

> The female observed to oviposit was first discovered when the ovipositor was inserted nearly to its base in a fresh pear shoot of the present year's growth. After two minutes the ovipositor was withdrawn. The female turned, inspected the hole, then moved along the branch about two inches. After five minutes she became very active and proceeded along the branch feeling with antennae and beak. She soon returned to the spot where eggs had been placed before, and, with proboscis to mark the opening, she raised up, unsheathed the ovipositor, and made the insertion much in the same manner as observed in the case of apple red bugs. A period of two minutes elapsed before the ovipositor was withdrawn. Upon examining the branch, it was found that six eggs had been laid in a space 1 mm. long. The eggs were closely packed in a double row lying flat just within the cambium layer. Of two eggs measured, the length is 1.05 mm. by 26 mm. wide.

HABITS OF NYMPHS.

The nymphs of this insect are extremely elusive in their habits, which probably explains the fact that, though their injury has been known for many years, they themselves have never been connected with it until the present time. When disturbed they run rapidly, hiding in the axils of the leaves or any place that affords concealment. When disturbed suddenly, they often drop, but usually alight on another branch before reaching the ground. In cases where nymphs fallen to the ground have been prevented from reascending the tree, by means of tanglefoot bands, beneath which they cluster, it has been observed that when a person suddenly approaches the tree, a number of them will drop to the ground. Others have been observed to drop in this way when approached by an enemy or harvestman.

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*Jour. of Economic Entomology, Vol. 8, No. 2, pp. 296-297.

The young nymphs seem to prefer the young foliage of apple and pear, but will also puncture the tender shoots. Later they freely attack the blossoms, but they forsake all other food for the fruit once it has set. Though we have reared through these insects exclusively on leaves, there is no doubt that the later nymphal stages prefer fruit, and they can only with difficulty be induced to feed on mature leaves. A favorite place to feed is a cluster of fruit growing closely together and not having reached the size when their own weight pulls the separate fruits apart. In feeding, the nymphs range quite widely over the tree, especially when not numerous. Every fruit on a very lightly infested pear tree was pierced several times, showing that several must have been punctured by one insect. This observation was further confirmed by liberating a number of nymphs beneath a non-infested tree. The next day the typical injury was present all over the tree. The nymphs were observed to exhibit predaceous habits on several occasions. At one time a number of bugs were observed repeatedly thrusting their beaks into three larvæ of the green fruit worm (*Xylina* sp.) that had become caught in a tanglefoot band, and continued to do so until the caterpillars had been sucked completely dry. They will also on occasions attack man. The writer has been stung in the neck and hand more than once. If left alone the insect will pierce the skin of the hand as many as three times and remain feeding until gorged with blood.

Habits of Adults.

The adults, like the nymphs, are very active. On bright, sunny days they usually take to flight very readily when disturbed. On dull, cold days they are more sluggish and sometimes drop to the ground, though often they take to flight after having dropped a short distance. On really hot days the adults fly about considerably, and, standing in a heavily infested orchard, they can be readily observed flying about in the sunlight.

Since the prevailing opinion is that the pest spreads but slowly in an orchard, experiments were tried to determine the length of flight of the adults. When liberated the insects fly straight up in the air for a considerable distance, after which they can be followed by the eye for several yards, as they fly straight off in one direction. Just how far they fly at any one time it would be difficult to determine, but individuals have been taken one quarter of a mile from the point of liberation, a few days later.

Like the nymph, the adult may also become predaceous in habit. The writer observed one with beak inserted full length in a tussock moth larva, and it relinquished its hold very reluctantly. It will also pierce the skin of man quite as readily as the nymph.

The adult Lygus will not feed upon foliage at all readily, preferring a diet of fruit, and, unlike the nymph, which seems to prefer the apple, the adult seems to have a preference for the fruit of pears. One case was observed in which a row of pear trees had been freed of nymphs by spraying. Adjoining this row was a number of infested apple trees, and as soon as the bugs developed wings, they flew over

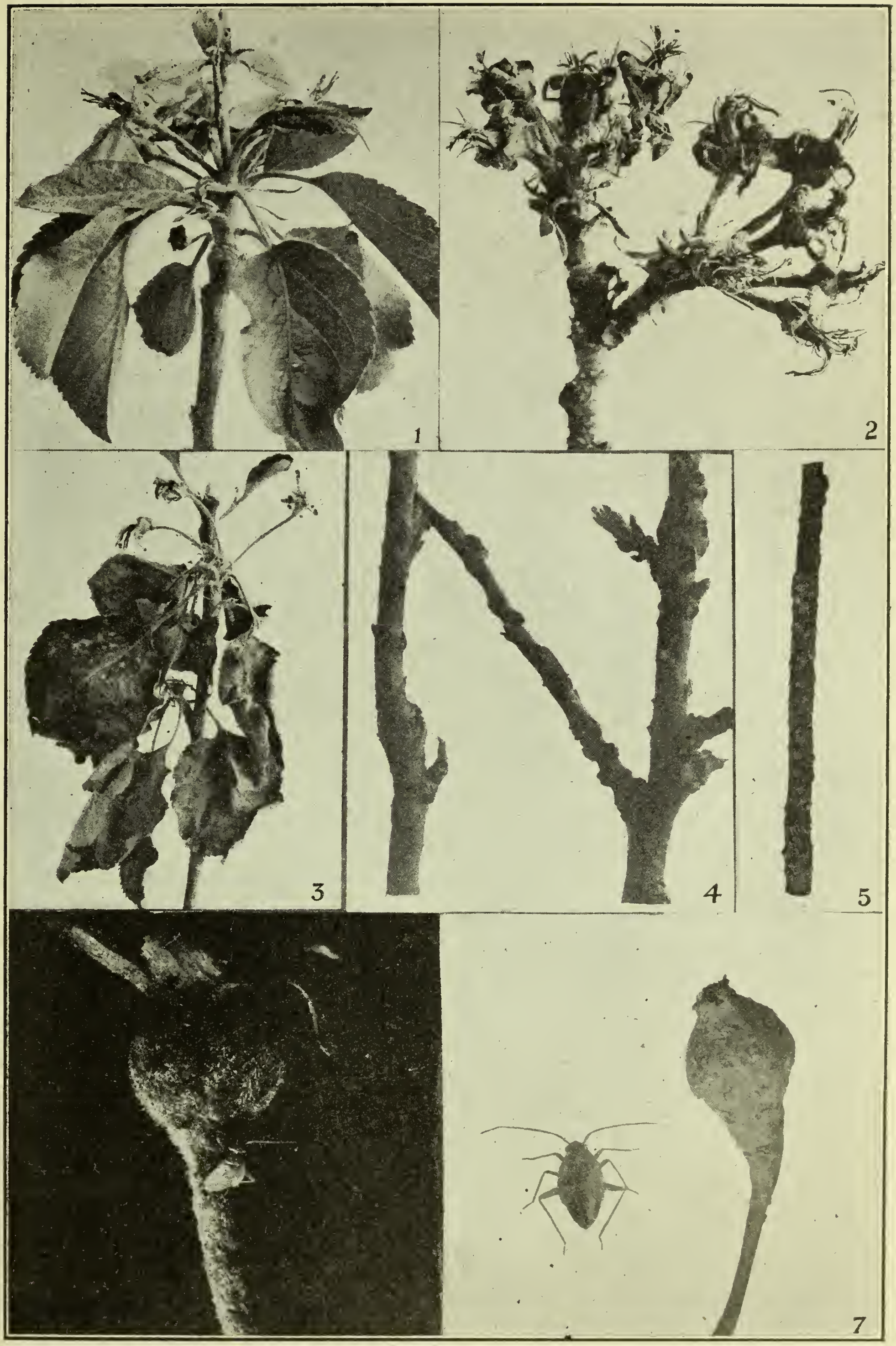


Plate II.—*Lygus invitus.*

Fig. 1.—Injury to blossoms.

Fig. 2.—Final condition of injured blossoms.

Fig. 3.—Blossoms and twigs killed by repeated punctures.

Figs. 4 and 5.—Twig punctures.

Fig. 6.—Nymph at work on a young apple.

Fig. 7.—Fifth stage nymph and young pear, showing effect of punctures.

and pierced the pears till they were bathed in the sap that oozed from the punctures. In the laboratory, adults have left a fairly ripe, soft apple to feed upon a hard green pear. All through the season a favorite place for the bugs to feed is about clusters of apples that have been dwarfed by the Rosy Aphis, and here the adults can be found, when nowhere else, late in the season. These belated individuals also show a preference for over-ripe or even decaying fruit.

CHARACTER AND EXTENT OF INJURY.

1. INJURY TO THE APPLE.—The first evidence of injury is to the tender foliage in the form of purplish spots upon the surface of the leaf, accompanied, in severe cases, by a slight tendency to curl. To one who is familiar with the work of this insect, this symptom is most characteristic and makes it possible to detect the presence of the nymphs at a very early stage, and even when they are present in small numbers. Six newly hatched nymphs were placed on an apple seedling in the laboratory, and twenty-four hours later every leaf was spotted with the typical purplish markings. As the leaves unfold and later reach full size, the discoloration disappears, but if affected leaves are held up to the light they will appear to be pierced through and through with tiny holes. Very severe attacks result in a ragged, frayed appearance of the leaf. By these symptoms, the former presence of the bugs on any tree can be detected long after they have completed their transformation and disappeared.

The tender, succulent twigs are also subject to attack, and as the insect withdraws its beak a drop of clear or amber sap oozes through the bark, marking the puncture. Later, as the twig increases in size, quite a decided lump may develop at the point of puncture, accompanied in severe cases by a longitudinal crack.

In heavily infested orchards, where the insect may be present in tens of thousands, the repeated puncturing and withdrawing of the sap goes so far that affected twigs wilt, the leaves become brown and dry, and finally the whole shoot dies. Cases where many of the twigs were literally stung to death in this way were quite common early in the summer. Later the dead twigs dropped off and were replaced by a strong new growth, which covered up the injury done by the bugs.

As the blossom petals appear and begin to unfold they are quickly attacked by the young nymphs, which have been frequently observed right inside a blossom with beak inserted in the pistil. In fact, so numerous were the insects and so persistent their attacks that the blossoms and the blossom pedicels wither and die, having been sucked quite dry by the nymphs. These dead and dry blossoms remain on the tree for some time, but break off and fall to the ground before the end of the season. These facts explain why susceptible varieties may come into bloom year after year but never set a crop of fruit.

As soon as the young fruit is formed, drops of gum oozing through the skin show that it also has been punctured by the insect. Later, slightly raised, discolored spots mark the injury, and a large proportion of fruit so injured drops to the ground in the course of a few days. Apples that are able to cling to the tree or that remain uninjured until later on in their life, are badly gnarled and misshapen as a result of the insect's attack. The tissue above the puncture fails to develop and, as a result of the uneven growth, the apple will be one-sided with a pronounced depression about the point of puncture, which itself is marked by a brown, corky scar with ruptured epidermis.

2. INJURY TO PEARS.—Injury to the leaves, stems and blossoms of the pear resembles that of apple, except that in this case the tissue about the puncture

turns black. Stinging of the young pears does not often result in dropping, as in the case of apples. The effect of the punctures on the fruit is, however, very conspicuous, it being covered with hard, granular, corky scars, which are often split open as in the case of those on the apple. Hard, flinty areas extend into the pulp, making the fruit useless for any purpose whatever.

3. INJURY TO PLUM.—Injury to the fruit of plums is not uncommon, where these trees border on affected apples or pears. Plums injured by the bugs do not usually become scarred and twisted, as in the case of apples and pears, though they may sometimes grow somewhat one-sided. The seat of the injury is usually at the extremity of the fruit furthest from the stem. As usual in the case of stone fruits this injury is marked by the exudation of colorless gum which flows through the small puncture, sometimes forming a globule and sometimes a coil of gum which finally hardens in the air.

FEEDING EXPERIMENTS.

In affected orchards large numbers of nymphs are frequently shaken to the ground by sprays, heavy rains, winds, etc., and in numerous instances these were observed feeding upon dandelions, couch grass, red clover, and other plants at the base of the tree. Even when forced to feed on these plants early in the nymphal life the insects seemed to be able to complete their transformations, but once they had obtained their wings, they invariably sought the fruit of the apple or pear.

A number of nymphs in their second or third instars were divided into lots of ten and confined upon a number of plants under cheesecloth bags. The following observations were made:—

GRAPE (*Vitis* sp.).—The nymphs feed readily upon grape, puncturing leaves and blossom clusters. The tissue surrounding the punctures turns black.

ELM (*Ulmus americana*).—The injury to the foliage of the elm was quite noticeable in dark colored spots, but there was no apparent puncturing of the twigs.

MAPLE (*Acer saccharum*).—The injury to maple leaves was slight. The injury was characterized by small translucent spots.

SWEET CHERRY (*Prunus avium*).—Slight puncturing of leaves and blossoms, but little apparent injury.

PEACH (*Prunus persica*).—The leaves showed visible punctures and were slightly curled. Small globules of transparent gum showed where the fruit had been punctured.

RED CLOVER (*Trifolium repens*).—Transparent areas on the leaf accompanied by a gradual fading and wilting of the plant, characterized the injury to red clover.

STRAWBERRY (*Fragaria chiloensis*).—Strawberries showed evidence of more serious injury than any of the plants experimented with. Blossoms and leaves were so badly punctured that they finally withered and died.

COUCH GRASS (*Agropyron repens*).—The blades of couch grass were punctured quite severely, fading in color and showing other evidence of wilting.

SUSCEPTIBILITY OF VARIETIES.

Extensive observations regarding the susceptibility of varieties reveals the fact that of all varieties of apples the Nonpareil is by far the most liable to attack. In many orchards it is only the trees of this variety that appear to suffer at all. Cases have been observed in which badly attacked Nonpareil trees were surrounded by trees of other varieties apparently untouched. Nevertheless, it seems to be true that in most cases the bug will gradually enlarge its field of operation from the more to the less susceptible sorts. Fruit-growers tell of numberless instances where the trouble began in their Nonpareil and gradually spread to their other trees. The following varieties show susceptibility in the order named:—Ribston, Gravenstein, Golden Russet, Blenheim, Baldwin and Greening.

Among the varieties of pears attacked the Bartlett shows the highest degree of susceptibility. So much is this the case, that some have regarded the trouble as a disease of this variety. Other susceptible varieties are Clapps' Favorite, Burbridge, Maria and Flemish Beauty. Varieties not so susceptible are Louis Bonne, Bosc, Lawrence, Duchess and D'Anjou.

Conditions Favoring Increase.

It is difficult to state definitely under what condition this insect flourishes best, since it is found in orchards treated in every conceivable way. Sprayed and unsprayed, clean cultivated and sod, well cared for and neglected orchards are all attacked. It is a notable fact that some of the very worst infestations are in orchards that have received the best of treatment in the way of spraying, fertilization and tilth. In most cases, however, such orchards were unduly shaded, insufficiently pruned, or too thickly planted. In two very bad cases the orchard was cultivated on the strip system, i.e., a strip of clover sod alternated with a clean cultivated strip. In another case the orchard was part cultivated, part in sod. Here the trees in sod seemed to show the greatest evidence of injury, but the difference was not readily detected. On the whole orchards with a thrifty, succulent growth seemed to suffer most.

As a result of all our observations throughout the infested area, it appears that the most suitable conditions for the undue increase of this pest are shady orchards with closely planted, thick growing trees, with a certain amount of herbage at their base, but for the most part thrifty and vigorous in other respects. Nevertheless, these factors are not essential, as the insect is capable of doing injury under a wide range of conditions.

Natural Enemies.

Ants seem to be the only natural enemies that exert any appreciable influence on the control of this pest. These have been frequently noticed carrying away nymphs on their jaws. On one occasion, when a number of nymphs were liberated at the base of the tree, four of them were seized by as many ants and carried off through the grass to the ant hill, which was distant fifteen feet from the tree. Spiders also destroy a certain number of nymphs, but it is questionable whether ants or spiders ever kill enough nymphs to noticeably reduce their numbers. The ant responsible for this work was determined by Dr. Wheeler as *Formica fusca.*

Control Experiments.

Control experiments were carried on under most unfavorable conditions this spring, the weather being almost continuously wet. This made it very difficult to apply the spray at the proper time or to observe its effect upon the insect. Two orchards were chosen, containing a large number of mature apple and pear trees of the susceptible varieties.

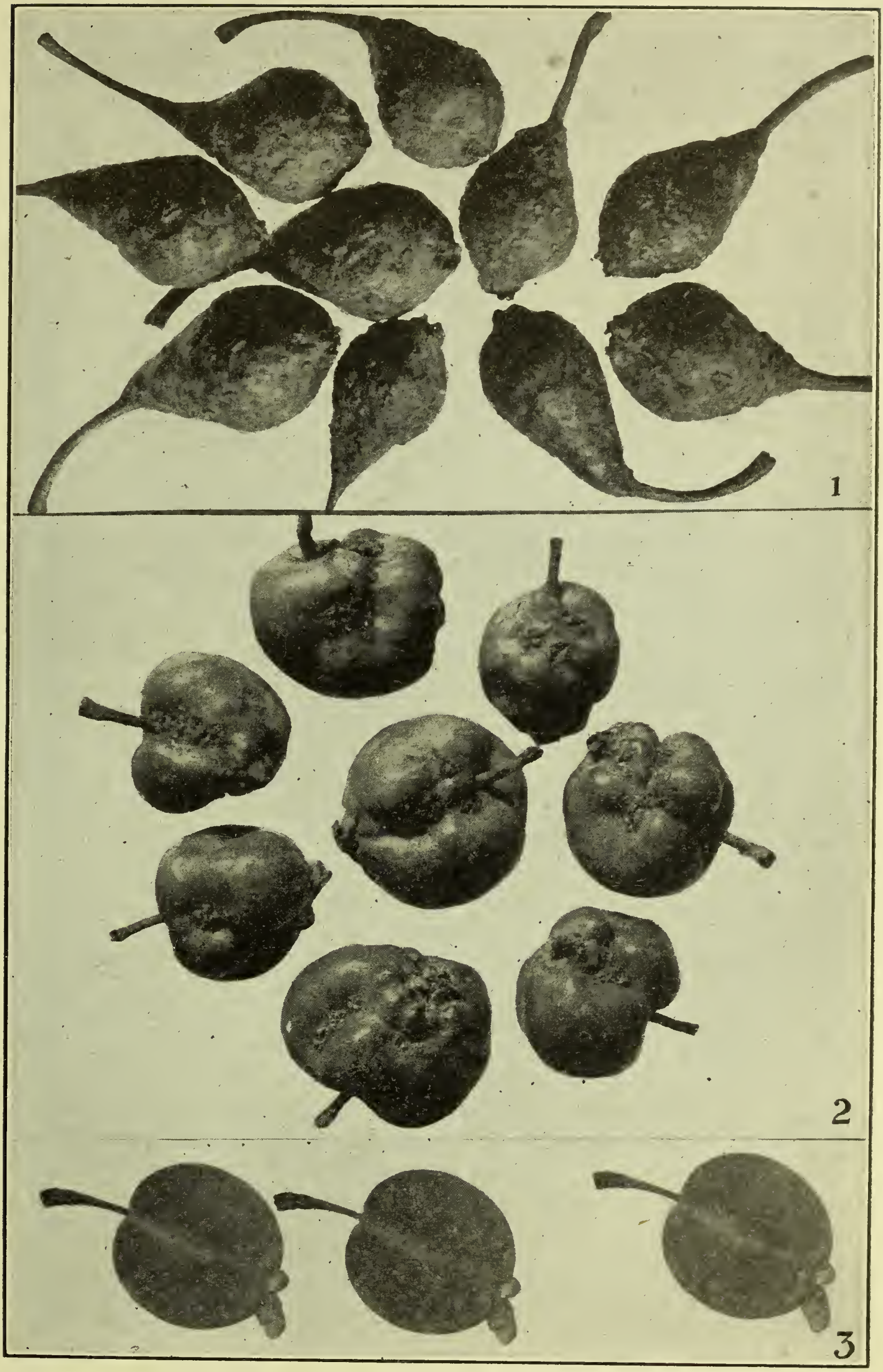


Plate III.—*Lygus invitus.*

Fig. 1.—Injured pears.
Fig. 2.—Injured apples.
Fig. 3.—Injured plums.

Blackleaf 40, 1 pint, 1½ or 2 pints to 100 gallons was used both alone and with soap, and also in combination with lime-sulphur. One spray was put on just before the blossoms opened, with another just after the blossoms fell, for the apples. Another block was sprayed in full bloom. Pears were sprayed just after their blossoms fell and again five days later.

Examination of trees directly after spraying showed them to be apparently free from insects, and large numbers of dead nymphs would be found stuck to the leaves by their caudal extremities in the characteristic fashion. Examined two days later, though the block sprayed in full bloom seemed to show best results, all the trees were found to be covered with bugs. As laboratory experiments had shown that the material used was quite effective in killing the insect when hit by the spray, even when the weakest strength was used, we knew that the trouble was not in the strength of the spray, or in the manner of its application.

Observations taken in the sprayed orchards showed large numbers of nymphs ascending the tree trunks. Even in unsprayed orchards it would appear that large numbers of nymphs fall to the ground, shaken off by the high wind or washed off by the heavy rains. Insects were found in abundance beneath the trees in such orchards or climbing up the trunks.

In order to determine to what extent nymphs were washed off during spraying and whether any considerable proportion of these succeeded in reascending the tree, one large tree was sprayed thoroughly with Blackleaf 40 and soap, after having been banded with tree tanglefoot 3 feet from the ground. Shortly after spraying the trunk of the tree beneath the band was green with nymphs. These were counted and removed each day for seven days, and at the end of that time the total number of insects captured beneath the band reached the total of 1,389. Large numbers, of course, went up adjacent trees, 538 being taken from one of these. It should be noted here, that this number represents but a very small proportion of the insects originally on the tree. By far the greater number were killed and their dead bodies could be found in abundance sticking to the leaves or on the ground. Nevertheless, where so many thousands were present they were sufficient in number to sting every fruit on the tree and so destroy the crop.

To determine whether the effect of the spray was merely mechanical or whether the insects that fell were partially overcome by the spray material, another tree was given a strong spray of water with a drive nozzle and at a pressure of 200 pounds. In this case the total for seven days was 308. This shows that there was something beside the mechanical effect responsible for the large drop from the sprayed tree. This may be due to the insects being hit by the spray, but not sufficiently covered to cause death. Again, it may be that the effect of the nicotine fumes is to make the nymphs relax their hold and drop to the ground. Laboratory experiments have shown that the fumes of the spray material alone are sufficient to cause death. Nymphs were placed on apple seedlings in cages and at the base was placed cotton wool soaked in Blackleaf 40 at the regular strength. The next day the nymphs were dead.

Experiments were made to determine the distance the nymphs were able to travel and reascend the tree. In an orchard that had not been cultivated for several days, four trees 30 ft. apart each way were banded and 300 nymphs liberated midway between them. The next day 17 insects were taken from beneath the tanglefoot band. A similar experiment was tried with 150 bugs in an orchard that had just been thoroughly cultivated. In this case 19 insects reached the trees. The same experiment was repeated in an orchard that was in sod and 300 nymphs liberated. In this case none reached the tree, but could be seen feeding freely upon the grass and clover. That the nymphs do travel through a sod orchard, however, is shown by the fact that a number were taken from a young tree of the current season's planting, placed midway between two trees thirty-five feet apart.

It was evident from the foregoing experiments that, in addition to spraying, some method must be devised to prevent the nymphs that fall to the ground from reascending the tree, and continuing their injury. Accordingly, another block of trees was sprayed, some of which were banded with the tanglefoot and others not. Subsequent examination showed that the unbanded trees showed insects in abundance, while on the banded ones it was almost impossible to find a single nymph. Experiments showed also that a thorough harrowing after spraying had the same effect as banding. Of all the unbanded trees, those sprayed in full bloom showed the least injury, but even on these trees the fruit was so badly scarred as to be practically worthless.

Another difficulty arose in this connection, viz., that the nymphs are capable of feeding and coming to maturity on grass or weeds growing beneath the trees. Cases occurred in which fruit which had been kept clean by spraying was rendered worthless by adults flying in from outside. For this reason, if this pest is to be controlled, the orchard must be kept under a system of clean cultivation until the end of the first week in July.

The control of the Green Apple Bug in Nova Scotia sets a new precedent in heavy spraying in that Province. Furthermore, the method of planting and heading frequently does not lend itself to the kind of spraying required. The trees are frequently very large, headed very high and planted very thickly, so that it is impossible to get through the rows with a tower on the machine, which is the only way that the tops can be reached. Furthermore, the trees are often very thick-headed, so that even with other conditions favorable, it is a matter of very great difficulty to hit every insect with the spray, and attempts to control the pest in such trees is certain to result in failure. All the foregoing facts must be kept in mind if this pest is to be eradicated from the orchard.

SUMMARY.

The observations and experiments of the past season may therefore be summarized as follows:—

1. The Green Apple Bug is one of the most serious pests of apples and pears in Nova Scotia, though hitherto, owing to its elusive habits, it has not been recognized as such.

2. It is the cause of "woody pears" and one of the causes of gnarled, twisted apples. It is the most common cause of the continued failure to bear of Nonpareil and certain other varieties of apple. It attacks not only the fruit but also the foliage, stems, and blossoms of apples and pears, and in the adult state has been known to attack plums.

3. The nymphs are frequently caused to drop from the trees by high winds, heavy rains, sprays, etc., and may then either reascend the tree or feed upon the weeds, grass or clover at its base.

4. Though capable of coming to maturity on the foregoing plants, in the adult state they invariably seek the apple and pear to deposit their eggs.

5. In control, not only must the tree be thoroughly sprayed to kill as many bugs as possible, but those which have fallen to the ground must be kept there without food until they starve. If the orchard is in sod, or weeds are abundant, the insects on reaching the adult state, will fly to the trees and continue their work.

6. The orchard must, therefore, be kept in a state of clean cultivation, until all the insects have reached the adult state, which will be at the end of the first week in July.

7. The trees must be banded with tree tanglefoot to prevent the reascent of the insects that have fallen to the ground.

8. The trees must be properly pruned, so that all parts can be readily reached by the spray.

9. Apple trees should be sprayed with Blackleaf 40 in the strength of 1 pint to 100 gallons, just before the blossoms open and again after they fall; pear trees just after the blossom petals fall and again five days later.

10. A very heavy, drenching spray must be applied.

11. The insects are much more easily controlled on pears than on apples so that with light infestations in this tree, spraying alone should be sufficient to control the pest.

CONCLUSION.

The foregoing is only a summary of a single season's work. New facts will doubtless be revealed by subsequent study. The work was carried on under considerable difficulties, the pest being a new one and little known regarding its habits. The methods of control which have been given require considerable care in their application, but once the pest is eradicated it should not be so troublesome to prevent further serious infestations. The great need at the present time is an insecticide cheaper than Blackleaf 40, that will do the work as effectively. However, even under present conditions, growers who have lost entire crops from the work of this pest will not hesitate to take the measures recommended.

THE PRESIDENT: Professor Brittain is to be congratulated on the amount of work he has accomplished in a single season, and also the extent of his work. I myself have noticed the corky pears in Nova Scotia, but I never performed the crucial experiments which induced Professor Brittain to undertake the eradication of the pest. I can personally testify to the extraordinary damage which is now being caused by this insect throughout Nova Scotia. I was down there about three weeks ago and was able to see the results of the damage. I was also able to appreciate the extent to which the fruit-growers in the Annapolis Valley are grateful to Prof. Brittain for discovering the cause of these corky pears and the cause of the injuries on the Nonpareil trees. I know there are a number of members here who wish to ask Professor Brittain questions, and the paper is now open for discussion.

PROF. CAESAR: On account of the similarity of this paper to the next I think the discussion of this paper should be postponed until after the next.

THE PRESIDENT: You move that the discussion of this paper be left over until after the next?

MR. TREHERNE: I second the motion. Carried.

A CAPSID ATTACKING APPLES.

(*Neurocolpus nubilus Say.*)

H. G. Crawford, Wilton Grove, Ont.

In the Province of Ontario four Capsids, or Plant-bugs have been found attacking apples, namely: *Neurocolpus nubilus, Lygidea mendax, Heterocordylus malinus* and *Paracalocoris colon.* The nymphs of the second and third are the so called "Red-bugs" described by Crosby of Cornell. *Lygus invitus,* the False Tarnished Plant-bug, occurs in abundance in the Province, but, strange to say, has not been observed doing any damage either to apples or pears, though a great pest in Nova Scotia and causing considerable damage to pears in New York State.

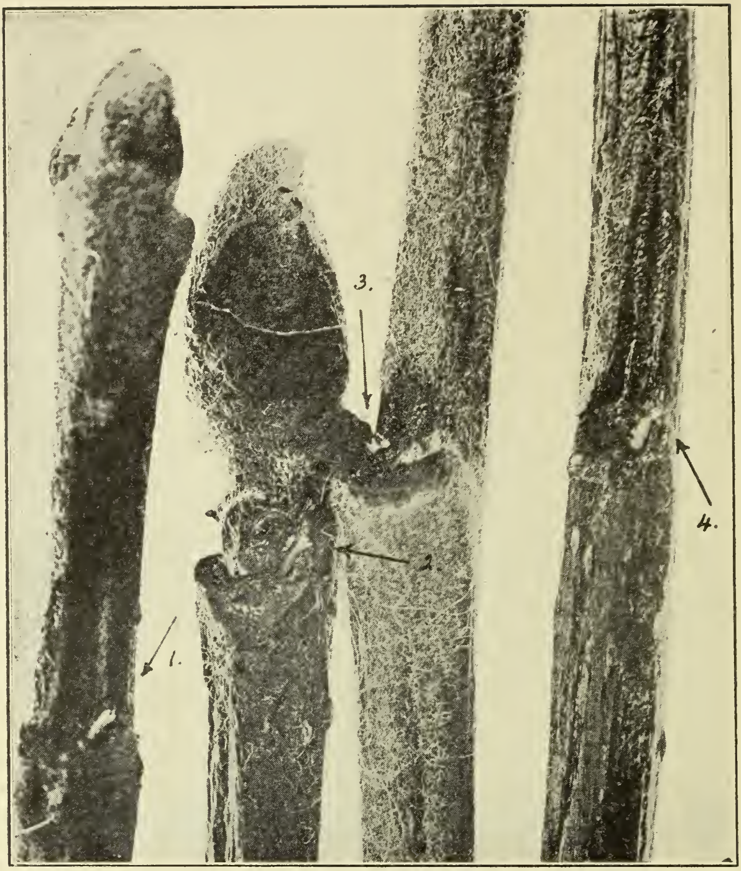
Of the above four injurious Ontario species the only ones of much importance so far as known at present are *Neurocolpus nubilus* and *Lygidea mendax.* Crosby in Bulletin 219 of Cornell University described the life history, habits and means of control of the latter; but very little was known about the former, and as this was the more common and troublesome Capsid in Ontario and, as requests for information on the means of control had begun to be made, Prof. Caesar decided to attempt to work out its life-history this year, being influenced also by the fact that this species was very common in the same orchard where he had planned to study the Leaf-rollers of the Apple. It was my good fortune to be chosen to do this work under Prof. Caesar's guidance and with his personal co-operation so far as his other duties permitted. The following is a brief account of the knowledge gained.

History of the Insect in the Province.

There is no doubt whatever that this Capsid has been present for many years in Ontario, in fact it is apparently a native species. It is only very recently, however, that it has been discovered to be an apple pest. In 1909 Prof. Caesar was shown by Mr. Jos. Tweddle some deformed apples that caused him to suspect that a Capsid might be to blame. In 1910 he accordingly visited Mr. Tweddle's orchard at Woodburn when the apples were about the size of small marbles, and saw the nymphs at work, though at the time he was not sure of the species. In 1911 he again visited the same orchard, saw both these nymphs and those of *Lygidea mendax* feeding on the fruit, and from specimens brought to Guelph reared adults of three species: *Neurocolpus nubilus, Lygidea mendax,* and *Paracalocoris colon.* In 1914 he found the former two species were in a large orchard at Hamilton, and in 1914 found nymphs of *Neurocolpus nubilus* alone in abundance in the orchard of Johnson Bros. at Simcoe. This is the orchard in which the investigation was carried out. There has been no opportunity to examine many orchards to see just how important the pest is in the Province. We suspect that it occurs in a good many orchards but know that the great majority of them are free or almost free from the pest.

Distribution.

This insect has a very wide American distribution. From literature at our disposal, records were obtained of its presence in a collection of Capsids made in Panama and Guatemala, in the States of Florida, New Mexico, California, Colorado, New Jersey, Maine and New York, as well as in the Provinces of Quebec



Eggs of *Neurocolpus nubilus in situ* on first-year Spy twigs, all, with the exception of (2) having had the leaves and buds removed. Enlarged about 5 times.

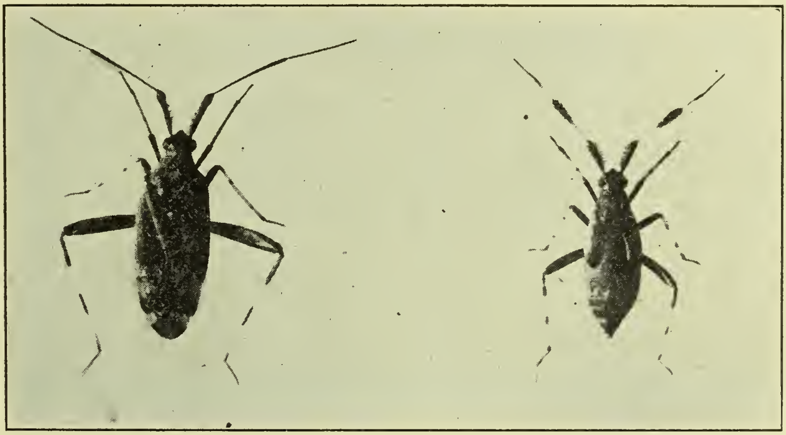
(1) Egg just as it was after the leaf and bud had been removed, half its length being buried in tissues of the twig;
(2) Egg, with leaf only removed, position at side of bud not normal, but curve of egg well shown;
(3) Two eggs close together, thrust very far down into tissue, and being completely hidden by bud and leaf;
(4) Eggs with tissue cut away from front, showing rounded lower end.

Adult *Neurocolpus nubilus*, and two nymphs.
(Natural size.)

and Ontario. In Ontario E. P. Van Duzee reported it as "common and highly colored" in Muskoka during July and August, 1888; he also saw a specimen that had been captured at Temagami in 1908. It has also been observed by Prof. Caesar, Mr. G. J. Spencer or the writer in the following additional places in Ontario: Woodburn, Hamilton, Fonthill, St. Catharines, Wilton Grove (Middlesex County), and in Norfolk County at Simcoe, Walsh and Tyrill.

LIFE HISTORY.

EGGS. Although we could never find a female ovipositing either in cages or in the orchard there seems no doubt that egg-laying extends over a long period, which this year would be from about July 15th to September 1st, most of it being over by August 15th, from which time the adults gradually decreased in number, completely disappearing by September 7th. The majority of the eggs are laid singly, but not infrequently two are found so very close together as to suggest that they might have been laid at the same time. They are invariably found behind the buds which are situated in the axils of the leaves on the new growth. In addition to the Apple, eggs were found also on Sumachs. They were inserted into the tissues of the new growth. We suspect they are also laid in Elder though we are not sure. No eggs could be discovered on any kind of weed in the orchard. On apple trees they are so deeply pushed under the bud into the tissue that even the white tips are hidden from view. If the bud is removed the egg will be seen to be sticking out of the spongy tissue for from one-quarter in extreme cases to one-half its length, the average being about one-third of the length (see fig.). There is absolutely no external evidence of the presence of the egg when the bud and leaf are on the twig.



Adult *Neurocolpus nubilus* and nymph. (Enlarged.) Note the clavate hairs on antennae of nymph.

This year the eggs began to hatch on May 27th; the maximum hatching taking place between June 5th and June 9th. Freshly hatched nymphs, however, continued to be found up to July 13th.

In this connection it will be interesting to note the relationship existing between the maximum hatching of the various kinds of apple-attacking Capsids and the stages of the apple trees in each case. Thus this season at least (1915) the majority of the eggs of *N. nubilus* in Ontario hatched from *just after the* *calyces had closed up to the time when the fruit of the Spy trees was one-quarter inch in diameter. Lygidea mendax* in Ontario and in New York hatches most freely *just as the blossoms are opening out well.* Of *Lygus invitus* in Nova Scotia the maximum hatching takes place *during the period of maximum bloom,* and of *Heterocordylus malinus* in Ontario during the period from the time the Spy blossoms are *opening up to full bloom.* Of *Paracalocoris colon* in Ontario the records are not definite, but nymphs gathered at Woodburn in 1912 with *N. nubilus* were in the same instar, suggesting that they may have hatched about the same time. However, in 1912 *N. nubilus* seemed to hatch somewhat earlier than in 1915; thus making impossible the assignment of a date of hatching for *Paracalocoris colon.* From this comparison it can be seen that a spray designed to control the other Capsids and which could be applied at the time of the spray for the Codling Moth would fail to control *N. nubilus,* at least during the season of 1915, because it would be too early for this species.

Nymphs. The nymphs, which appeared first on May 27th, at first grew rather slowly but later seemed to grow more rapidly. By June 11th the largest were about 3 mm. long, and by June 20th many were found 5 mm. long, exclusive of antennæ. About June 22nd the largest were slightly over one-quarter of an inch in length and wing pads were then present on quite a number. The first adult was seen on June 30th. Thus we suppose the nymph stage requires in the neighborhood of a month in a cold season like that of 1915. In a warm season, however, it is quite probable that less time would be required.

Adults. From June 30th the adults increased in number until by July 15th they outnumbered the nymphs present. Many of the females at this date were distinctly swollen with eggs, which upon being examined seemed to be perfectly formed and, though as mentioned above, no egg-laying was ever witnessed, there is no doubt that oviposition began about the middle of July. It is perhaps worth recording that we never saw any mating of the sexes. Males do not live so long as females. Several of the latter which were in the adult stage when put in a cage on July 9th were still alive on August 12th, having lived at least 33 days. From July 15th for two weeks the number of adults seemed to be constant, then began slowly to decrease till by August 24th very few were observed, and these had disappeared entirely by September 7th.

Description of Life Stages.

Eggs. The egg is 1.5 mm. long by .3 mm. in average diameter, quite strongly curved, slightly club-shaped, nearly colourless, with a glistening white cap. The end which is thrust into the twig is slightly larger than the other, is rounded, and circular in cross-section. Towards the other end the egg gradually flattens, is oval in section and is surmounted by a definite, glistening, white, cylindrical hollow cap, which makes up about one-sixth the total length of the egg (see fig.). The cap appears as though it had been slipped on over the end and is deeply notched on the flattened sides. The tips of the projections so formed, draw more or less together after the eggs are laid, suggesting somewhat a minute lobster claw.

Nymphs. The nymphs, when freshly hatched, are about 1.5 mm. long, almost colorless, with large triangular head, large dull red eyes and with long stout antennæ and legs marked with faint reddish bands. They are quite sluggish and were mistaken by one of Ontario's best apple growers for aphids.

All the later stages of the nymphs have green bodies with dull reddish mottlings upon the back and sides; the second abdominal segment has a small circular black spot which persists in the adult though hidden by the wings. The antennæ are long and conspicuous, the first and second joints bearing a broad band of close-set, prominent, dark-brown, *clavate* hairs (see fig.). The legs are slender and distinctly marked with red bands. The nymphs, when in the last instar, attain a length of a quarter of an inch, and bear a pair of conspicuous wing pads. Nymphs in all stages after the first moult are very much alike, though the reddish mottling becomes more pronounced and darker as they grow older and increase in size.

ADULT. The adult is slightly more than a quarter of an inch in length being distinctly longer and narrower than the Tarnished Plant-bug (*Lygus pratensis*). (See fig.). The general colour varies greatly both in the case of those living on different hosts, where it is very marked, and also to a lesser extent among those living upon the same host. The dorsal aspect of those living upon the apple varies from a dull cinnamon brown with dark areas to a reddish black with light areas. It has a dull felty appearance due to the presence of numerous fine light to dark cinnamon hairs upon the thorax and thickened part of the wings. The sides are mottled with a dull, dirty red, and ventrally the colour is a light green. The antennæ are longer than those of the Tarnished Plant-bug. The basal joint is stout, dark in colour and densely clothed with dark brown hair, many of which in fresh specimens are distinctly clavate. The second segment is slender, elongate and slightly club-shaped, the distal half being dark brown and clothed with very short, dark brown hairs. The legs are slender and have the same reddish banding as those of the nymphs. Referring to this species Prof. E. P. Van Duzee states: "No other Capsid known to me has thickened, clubbed hairs on an incrassate first joint."

HABITS OF NYMPHS.

The nymphs, when they first appear, are rather sluggish in their movements and are found on the lower sides of the opened leaves, also in the unopened leaves, and in those leaves which had been rolled up by the Leaf-rollers. In these rolled leaves they remain at night and on cool or rainy days and in the cool part of the mornings, coming out and moving around somewhat during the heat of the day and feeding on the tender leaves. When the apples were about a quarter-inch in diameter these were attacked, the attack continuing for about ten days till the apples were a half-inch in diameter. Then the fruit was deserted and the great bulk of the insects made their way to the ground and soon were found feeding upon practically every plant growing in the orchard. The suckers at the base of the trees, red clover and curled dock were the favorite food plants. They fed also upon alsike clover, Canada blue grass, rye, evening primrose, peach trees, hairy vetch and timothy.

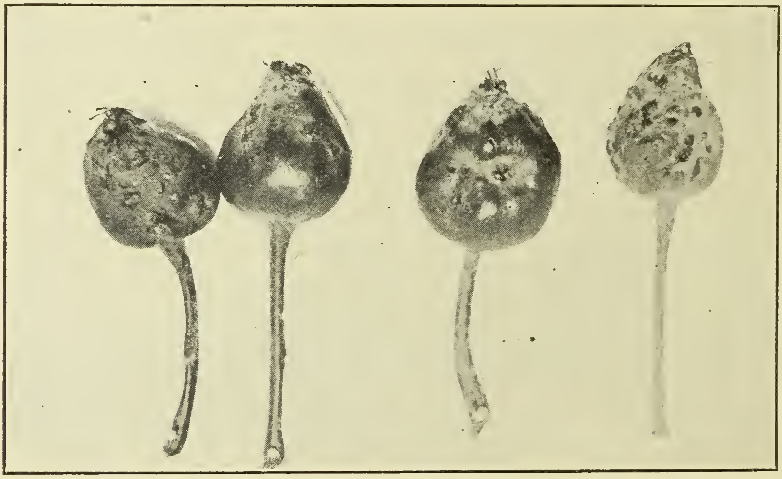
HABITS OF THE ADULTS.

When the adults began to appear the great majority of them were found upon the weeds and suckers, where they remained for about a week. At the end of this time a small proportion of them appeared on the trees where they moved slowly about constantly feeding upon the buds in the axils of the leaves on new growth. The proportion of those on the trees to those on the weeds seemed to remain nearly constant throughout the season, there always being some on the trees but never very many. On and about July 19th an attack upon the aphid-stunted apples took place and even a few sound Spys one and three-quarters of an inch in diameter were punctured, but this attack did not become at all general. However, at this time an attack of great severity was made upon the fruit of three trees of an unknown variety and lasted for a week. The adults feeding on the suckers, as before mentioned, confined their attention largely to the newly formed buds and the tender twigs, while those on the weeds showed a marked preference for the horseweed (*Erigeron canadensis*), which was abundant at this time. They seemed to be particularly fond of plants of this species infested by aphids. Other species of plants, however, were also fed upon, such as mullein, ragweed, pigweed, catnip, stinking mayweed, round-leaved mallow, burdock, golden rod, Hungarian millet, old witch grass, sumach, elder, orange milkweed (*Asclepias tuberosa*) and all the plants mentioned above as food plants of nymphs except where these had become too dry to attract them.

The adults, as a rule, were not very active and were quite easily captured, dropping from leaf to leaf when disturbed and only flying as a last resort.

INJURY.

FRUIT. The chief injury is due to the feeding of the nymphs upon the apples. It is done when the fruit is from one-quarter to one-half of an inch in diameter, and when the nymphs are still small. The first evidence of the attack is the oozing of droplets of juice from the punctures which are made at any point upon the surface of the apple. These punctures in three or four days are evidenced by small, conical to rounded pimples, varying in height and diameter from 2 to 3 mm. In their apices are small, very dark green spots of tissue, beneath which is a very slight streak about 3 mm. deep. These pimples vary in number from one to twenty-five or twenty-six per fruit, and where abundant on a very small apple cause it to wither and fall; on a larger one they very severely stunt its growth, and if the pimples are massed on one side, they cause the growth on that side to be checked, and the apple to be much deformed when mature. Where the pimples are few or scattered the apple may grow to normal size and nearly normal shape, the pimples becoming gradually less distinct or forming small raised, brownish, corky areas or convex russet spots from 3-4 mm. in diameter.

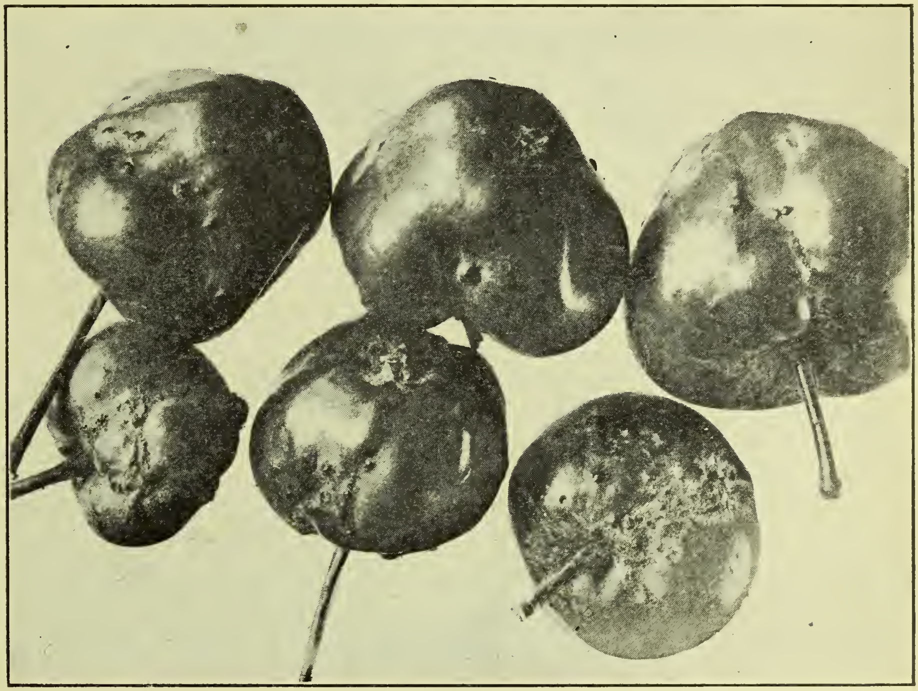


Injury due to the feeding of *Neurocolpus nubilus* nymphs upon young fruit very shortly after the attack. (Natural size.)

The orchard in which the observations were made had almost no crop, so no proper estimate of the damage done by these insects was possible. One tree, however, which had quite a few apples, had about 40 per cent. attacked, but only about 10 per cent. rendered culls, the rest being quite saleable as second-class fruit.

About July 19th a few of the Spys were attacked by the adults, but the feeding was very slight and of no importance. At the same time a very severe attack indeed was made upon three trees of an unknown large, yellow, seedling variety. The attacked fruit soon rotted and fell, due possibly to inoculations of Twig Blight (*Bacillus amylovorus*) with which the trees were badly attacked, and to which they seemed particularly susceptible. It is probable that this Capsid was the chief factor in carrying this disease from limb to limb and from fruit to fruit.

LEAVES AND TWIGS. No injury of any description was observed on the leaves themselves, but the tender buds in axils of the leaves of the young growth were punctured by both nymphs and adults, many of them being killed. The young twig itself was also punctured and, when badly attacked, the puncturing was followed by a small, very convex gall, which later in many cases split and became corky upon the top (see fig.). Both of these kinds of injury were confined largely to the suckers which became bushy and stunted with the tips of the twigs frequently dying. The new growth on the trees themselves was very seldom more than slightly injured.

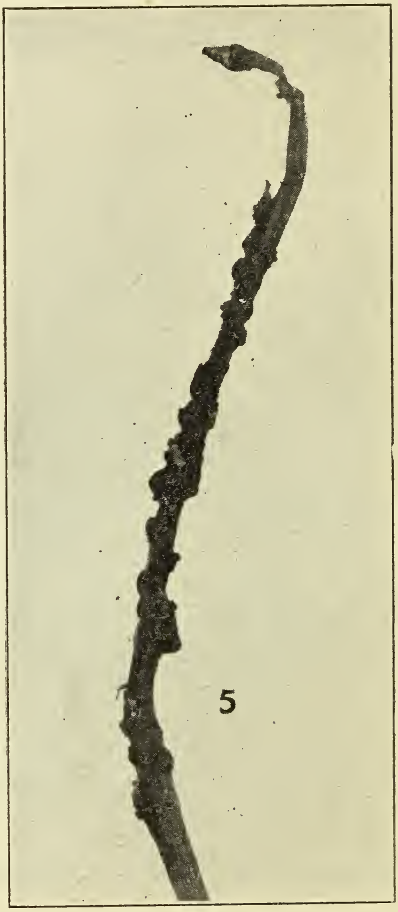


Injury due to the feeding of nymphs upon the apples when very small, about six weeks after the attack. Note the corky scars and pimples. (Natural size.)

SUMMARY OF CONTROL EXPERIMENTS.

In our control experiments kerosene emulsion and carbolic emulsion were both found to be almost useless for, even when applied with great thoroughness they failed to kill more than a small percentage of the nymphs.

Black-Leaf-40 was used alone with water in the proportions of one part of the solution to 1,066, 800, 400 and 250 parts of water respectively, but in no case was it at all satisfactory as it only killed a small proportion of the nymphs, even of the small ones. At first we thought that this spray would kill at 1 to 800 both by contact and by the fumes, but experiments showed that the nymphs were not dead but only stupefied and that they soon revived and appeared to be none the worse for the treatment.



Severe case of injury due to feeding of both adults and nymphs of *Neurocolpus nubilus* upon suckers at the base of the apple trees. (Natural size.)

The Black-Leaf-40, however, when used with soap—1 part of the solution to 800 parts of water, with 4 lbs. *Sunlight Soap* per 100 gals. of mixture—produced a spray which killed 96 per cent. of nymphs of all sizes, most of them being large. The tree was, of course, thoroughly covered with the mixture. Soap alone gave almost as good results but, owing to scarcity of nymphs at the time it was tried, was not given so many or quite so good tests. The results, however, were very gratifying. The efficiency of the soap spray was seen to depend chiefly upon its stickiness and power to glue the nymphs to the leaves and twigs. For this purpose Sunlight Soap was found the most satisfactory of any soap tested.

It should be mentioned that owing to the large number of rolled leaves due to the work of the three species of Leaf-rollers that were very abundant in this orchard, it was found impossible to get good results from spraying large apple trees because there was always a large proportion of the Capsid nymphs hidden in these rolled leaves where no spray could reach them. Consequently all experiments were performed on trees 4 to 5 years of age. Any rolled leaves on these were first removed, then large numbers of nymphs were placed on the trees and given plenty of time to settle down before the spraying was done.

We found also that the time of hatching of the eggs of this Capsid compared with those of the Red-bugs and of the False Tarnished Plant-bug was as mentioned above, so much later that the spraying just after the blossoms fell, recommended for them, would be useless for this pest, because only a very few eggs would be hatched at this date.

SUGGESTIONS FOR CONTROL.

1. Practise a system of clean cultivation of the orchard, keeping down all weeds until the end of June or as late as safe for the trees in that district. This will destroy large numbers of the nymphs which drop to the ground and which, unlike some species of Capsids, have no instinct to lead them back to the trunk and so must perish if there are no weeds to feed upon.

2. Watch the trees closely from the time the blossoms fall to see when the nymphs hatch and are abundant enough to justify spraying. Then apply with great thoroughness both to the upper and lower side of the foliage either (*a*) 2 lbs. of Sunlight Soap to 40 gals. of water containing Black-Leaf-40 at the strength of 1 part to 800 of water, or (*b*) 3 to 4 lbs. of Sunlight Soap to 40 gals, of water, preferably rain water if available. Dissolve the soap first by slicing and boiling in soft water.

In exceptional cases it may be necessary to repeat the spraying in a couple of weeks.

It is of course well to test the mixture on a few trees and observe results before spraying the whole orchard.

THE PRESIDENT: These two papers should provide a very interesting discussion as I know there are a number of workers here who are particularly interested in the injuries caused by these insects.

PROF. BRITTAIN: In regard to Mr. Crawford's statement that he was able to destroy 96 per cent. of the insects with Black-Leaf-40 and soap, I may say that our results were about the same. Unfortunately, the insects were so numerous that the remaining 4 per cent. left many thousands to infest the trees and ruin the crop.

MR. TREHERNE: The subject of Capsids affecting apples is a very important question in British Columbia. Blossoms in orchards, miles in extent, have been destroyed by Capsids and I am interested in the two papers that have been read.

PROF. CAESAR: Do you remember by what species?

MR. TREHERNE: As far as I know it was *L. pratensis,* but we have not given the matter much attention as yet.

PROF. BRITTAIN: I am well acquainted with the injury referred to by Mr. Treherne. During my stay in British Columbia a good deal of this Capsid injury came under my notice and considerable material was sent in to the office. I looked into the matter and succeeded in finding the insect responsible, but was not able to get it determined. If my memory serves me rightly, it was neither *pratensis* nor *invitus.* One of its favorable food plants is the mullein.

Prof. Caesar: There are a number of interesting points of comparison between *Lygus invitus* and *Neurocolpus nubilus;* (1) The damage done by the latter is not nearly so great as that done by the former as described by Prof. Brittain, and there is none of that corky growth or rough brown surface mentioned by him. (2) *Neurocolpus nubilus* seems, unlike the other species, to have no instinct to cause it, if it drops to the ground, to find its way back to the trunk, but instead wanders aimlessly around. *Neurocolpus nubilus* will feed on a great number of plants. It is probable its native host plant is sumac.

It is strange that while *Lygus invitus* is to be found all over Ontario in just as great abundance apparently as the other species, it does not, so far as I can see, do any harm to apples or pears. As for the difficulty of seeing the insects laying eggs, both species must be much alike for we could never find *Neurocolpus nubilus* ovipositing or even copulating.

Mr. Petch: This year we had a frost in the blossoming period, and I think the injury was caused by frost to the blossoms. However, as the injury occurred on only one tree I cannot see how that can be the cause, and I do not know what the injury to blossoms by this insect is like. Does it give the appearance of having been frozen?

Prof. Brittain: Yes, it looks very much like fire blight. The blossoms are brown and dead and I attribute a great deal of the so-called frost trouble to *Lygus invitus.*

Mr. Petch: With the use of Black-Leaf-40 in the ordinary strength do you find it injurious to the foliage of apples?

Prof. Caesar: We found that where Black-Leaf-40 was put on very heavy along with lime surphur it did seem to injure the apple foliage to some extent.

Mr. Tothill: The two accounts we have had of *Lygus invitus* in Ontario and Nova Scotia suggest the possibility that there may be two species concerned. The species of American Capsidæ are, of course, based on a study of museum specimens only. They are not based on habits and as the group is an extremely difficult one to do anything with, and as no breeding work of any kind has been done, it seems to me from the great differences in the habits of the so-called species that it is just possible there are two species concerned.

Prof. Brittain: Mr. H. H. Knight writes me that he is convinced that the species in Nova Scotia is a new variety. He intended to describe it as such in the near future.

Mr. Tothill: That would seem to bear out this contention.

The President: If there is no further discussion on these two papers we will proceed to the next, which is a paper by Dr. Cosens entitled, "The Founding of the Science of Cecidology."

THE FOUNDING OF THE SCIENCE OF CECIDOLOGY.

A. Cosens, Toronto.

At a time when the problem of gall formation is exciting deep and increasing interest, it seems opportune to consider for a few minutes those investigators, who, lured by the fascination of the subject, laid the foundation for its scientific treatment.

Centuries before any serious attempts had been made either to describe the structure of galls or to explain their origin, these abnormal vegetable growths had been noted and commented upon. The early ideas concerning them were fanciful in the extreme; such terms as "thunder bushes," and "witches' brooms," still popularly used, have crystallized in them the superstitions that enshrouded the origin of these structures. Some of the primitive, whimsical notions concerning them have been adhered to with surprising persistency. Even as late as the 18th century, Reaumur states that a number of German savants still attributed the production of *Neuroterus baccarum* Linn. to Satanic agencies. At the far-off time when galls first began to have a prominent place in the ancient botanical writings, ignorance frequently ascribed supernatural attributes to anything at all unwonted, or even occasional, and events of outstanding importance were often supposed to have been portended by perfectly natural trivial occurrences. It is not surprising, then, that the earliest naturalists should have seen, in the unusual structure of galls, signs that forboded the future. If an uninjured gall, opened in January or February, contained a fly, war must inevitably occur; if a worm, famine was foreshadowed; while a spider betokened pestilence. "Always for ill, and never for good," were the auspices. That the data, presented by galls, could be interpreted as a representation of the future, was proposed first by Magnus, in the 13th century, but the omen was still accepted by Lonicer and Mattioli, in the 17th.

When the old writers first refer to galls, they are sufficiently well-known to constitute an important part of the list of prescriptions formulated by the physicians of that age. A solution of the gall substance in water, or wine, was the common form in which these remedies were applied. Their marked astringent properties were familiar to the ancients, and, in this connection, it is interesting to note that gall products are still found in the British pharmacopoeia as astringent ointments. Two eminent writers, before the Christian era, who have made somewhat detailed reference to galls, are Hippokrates (406 B.C.-377 B.C.) and Theophrastus (371 B.C.-286 B.C.). The former, a famous Greek physician, dealt with the subject almost exclusively from a medical viewpoint. At various places in his writings he makes detailed reference to the efficacy of galls as remedies in cases where an astringent action is desirable. The latter's work indicates more of the qualities of the naturalist in its author, who must have observed the specimens rather closely, as, in general, he refers to their many sizes and colors, and to the various shapes of particular forms. He especially mentions a gall covered with weak hairs, that would serve as a wick, and a particularly hairy specimen that exuded a honey-like juice. One of the most striking observations which he has recorded is that the elm galls of *Tetraneura ulmi* were suitable for caprification, since they contained animals. Although it is apparent that he must have observed the insect producers, he did not, however, appreciate the relation between their presence and the origin of the gall. Also, the galls on the ash and pistachia were familiar to him, and with them he compares those on the elm. Theophrastus may have been taught the importance of observational work by Aristotle, whose favorite pupil he was.

While the work on galls of Pliny the Elder, who died in the eruption of Vesuvius, A.D. 79, is better known than that of any other writer of antiquity, yet he contributed very little really new material to the knowledge of the subject. He treats chiefly of the oak gall of commerce, *Cynips tinctoria* L., produced on *Quercus infectoria.* He distinguishes several forms of it, and names the variety of oak upon which each is found. He mentions in this classification the green gall-nut on the "hemeris" oak as the one best adapted for the preparation of leather,

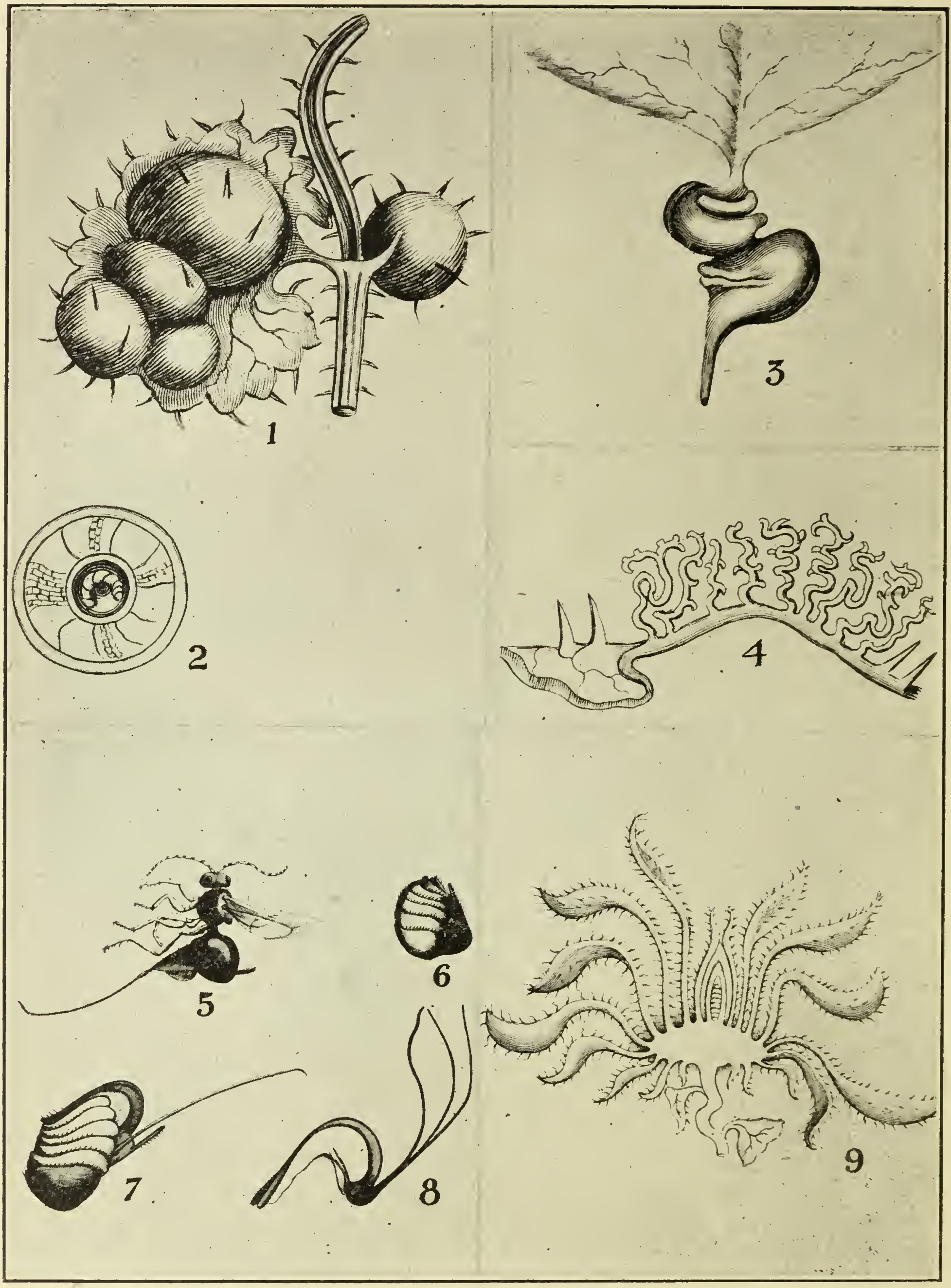


PLATE IV.—REPRODUCED FROM MALPIGHI'S "DE GALLIS."

Fig. 1.—Gall produced by *Aylax glechomae* Linné, on ground ivy. Fig. 2.—Section showing the larval chamber and the enclosed larva.

Fig. 3.—Aphid gall on the leaf of poplar.

Fig. 4.—Mite gall; the producer was unknown to Malpighi.

Fig. 5.—Cynipid producer; 6.—Abdomen of producer, with ovipositor retracted; 7.—The same with ovipositor protruded; 8.—Ovipositor.

Fig. 9.—Section of a willow gall, produced by a midge.

and the white gall-nut parasitic on "latifolia" as similar to the preceding, but lighter in color, and slightly inferior in quality. He includes, as well, the black gall-nut that grows on both the "latifolia" and the "robur" varieties of oaks. He states that the black gall-nut, when on the latter host, has holes in it, and is, in consequence, of much less value. The holes, that he notices apparently only in this form, were without doubt the exit channels of the producers. But, unfortunately for the progress of the science, this point escaped him entirely, and he saw in them nothing but a proof of the inferior character of the galls.

In common with his predecessors, Pliny shows the most perfect confidence, real or assumed, in the value of the medicinal properties of gall extracts. He recommends their use in the treatment of twenty-three different ailments, ulceration of the mouth, affections of the gums and uvula, burns, etc. Toothache may be allayed by merely chewing a little of the gall, but, to secure the best results in more serious disorders, the gall substance should be burned and quenched in wine, or in a mixture of water and vinegar. Pliny no doubt owed much that he has stated concerning the healing properties of galls to his contemporary, Dioscorides. This author named and described five or six hundred plants supposed to be medicinal, and included oak-galls in this primitive materia medica.

In addition to the oak-gall of commerce, the writings of Pliny contain references to other galls. He states that the "robur" oak produces one that can be used for illuminating purposes, and another that contains a sweet juice. These are clearly the same species mentioned by Theophrastus. In the axils of the branches of this same oak, Pliny has observed galls. Following his description of the species, it adheres to the bark without the medium of a stalk; at the point of junction with the host the gall is white, but is spotted elsewhere with black; the inner substance is scarlet in color, and has a bitter taste. Quite a concise and detailed description, considering the early developmental stage of the subject. It has been inferred that Pliny had seen Cynipid producers, since he speaks of a sort of gnat in watery pustules on the leaves of the "robur" oak. Clearly the correlation between the life-history of the insect and that of the gall was not noticed by him, and indeed it is not perfectly conclusive that he recognized the nature of the oak pustule as the same as that of the gall-nut, although he states that the two species mature in about the same way.

Many of the statements of Pliny incline us to the belief that he was influenced to a greater degree by tradition than by observation. Only some such charitable conclusion can explain his assumption that gall-nuts are a fruit of the oak, produced in alternate years with the acorns; or that the gall-nut develops in a single day, but shrivels up immediately if the heat strikes it.

The writers already considered may be regarded as representative of the ancient period of the literature dealing with galls. That era, in reality, contributed very little to our knowledge of the subject. Swellings on certain plants had been noted, and, in some instances, described, but, apart from that, nothing of scientific value had been accomplished. At that time, different hosts, such as the oak, beech, rose, and ash, were known to bear galls. They were supposed to be a fruit-like product of these trees, and it is extremely doubtful that the deformities on the various hosts were known to be of the same fundamental character. It is almost impossible that they could be so regarded, since the common and unifying element, their production by an insect, was unknown. The consideration of galls as fruits caused them to be looked upon as natural products, and made any attempt to explain their origin quite superfluous. During this period, confidence in the medical properties reached its maximum, and their extracts were recommended as infallible remedies for a long list of diseases.

For 1,600 years after the time of Pliny the scientific world slept, and, as a consequence, at the beginning of the 17th century the work on galls had been advanced very little beyond where the ancient naturalists had left it. During the time elapsed, while no appreciable progress was made, several writers had incidentally mentioned galls. Magnus (1193-1280), and Konrad von Megenberg (1309-1337), in particular, have referred to them in their general discussion of the oaks. The latter author introduced the term "oak-apple" as a synonym for the older name "gall-nut." Mattioli and Lonicer, about the year 1600, wrote on the subject, and, in imitation of the early physicians, recommended the gall extracts as a panacea for many ailments. Galls, acorns, and mistletoe were regarded as three varieties of oak fruit by these authors. Their belief in the oracular powers of galls has already been considered.

These desultory references to galls, however, do not indicate any special interest, and we may say that the subject had never been approached in a serious scientific manner until its importance attracted the attention of the Italian physiologist, Marcello Malpighi (1628-1694). This investigator was the outstanding figure of his age in medical science. He was physician to Innocent XII, and professor of medicine at Bologna, and afterwards at Messina. In his methods, he isolated himself entirely from the dogma of tradition, and based his conclusions upon his own observations. In his research work, he investigated the anatomy of the brain and lungs, and made a beginning in embryology by tracing the various stages in the development of the germ in the hen's egg. While his work along zoological lines has placed him in the front rank of the scientists of his own era, that on the botanical side has marked him out as one of the leading naturalists of all times. When a biologist of such ability penetrates into a practically unexplored region as that presented by the subject of galls, it is to be expected that the progress made will be quite phenomenal, and this has proven to be the case. The science of cecidology, with the founding of which Malpighi must be credited, was based by him upon taxonomic knowledge. His catalogue, "De Gallis," published in 1686, contains descriptions of a large number of Italian and Sicilian galls, and shows the intimate familiarity of the author with the included types. Prior to this work, the galls that appeared in the literature were, with few exceptions, confined to the rose, beech, and oak. But, in addition to such well-known forms as *Rhodites rosæ, Andricus fecundatrix, Cynips Kollari, etc.,* he has described others that are less common and more restricted in their distribution. For example, he collected *Aylax glechomæ* Linn. parasitic on *Nepeta hederacea.* a gall that has been widely introduced into America, and is almost certain to be found wherever the Ground Ivy is established. He was also the first to observe the beneficial gall nodules on the roots of Leguminous plants, and had noticed, as well, Erineum galls without being familiar with their production by mites. The deformities of this nature he has mentioned are those produced on Vitis and Populus. Malpighi did not concern himself only with the characteristics of the external form of galls, but applied his knowledge of plant anatomy to the investigation of their internal structure. By this means he became familiar with the course of development of several galls, and the typical stages of individual species.

Valuable as was the contribution thus made by Malpighi to our botanical knowledge of galls, it was overshadowed by the importance of his work along entomological lines. Indeed, the complexity and importance of the problem presented by the production of galls was never fully appreciated until he discovered their insect origin. Only then was the question seen clearly in its dual character, involving a stimulation by the producer, and a reaction by the host.

That he understood the nature of this reaction may be deduced from his statement that the plant is compelled to furnish a deformity that serves to nourish the deposited eggs of the insect. He must have observed the producers very closely, as he gives a detailed account of the curious ovipositor of the Cynipidæ, and mentions, also, the stalked character of their eggs. He further discovered that the galls are not left to the undisputed possession of the producers, but are inhabited by other insects. He seems to have grasped fully the importance, not only of a close study of the host plant, but also of the habits and structure of the insect parasite.

Malpighi has recorded a number of reflections concerning the biological relation between plant and insect in gall formation. His theory summarized in brief is that a poison, introduced at the time of oviposition, breaks down the substances of the cell sap, and diverts the currents of its transference into wrong channels, thus producing malformation by causing the growth energies of the plant to be wrongly directed.

Particularly interesting to us, as students of insect life, is the fact that the founder of the science of cecidology, realized the importance of the entomological viewpoint of the subject.

The President: As the writer of this paper is not present and as its historical nature rather frees it from any discussion, we will proceed to the next paper by Mr. Strickland on " The Army Cutworm in Southern Alberta."

THE ARMY CUTWORM IN SOUTHERN ALBERTA.

E. H. Strickland, Entomological Branch, Department of Agriculture, Ottawa.

The Army Cutworm (*Euxoa auxiliaris*) is new to Canada as a field pest, though it is a native species of the Western Provinces. Fletcher recorded it in 1903 as injurious to gardens in Regina and Calgary, but apart from this report the insect has not been described as one of any economic importance in Canada. Since 1898 it has been a frequently recurring field pest in Montana, where it was given its popular name.

In 1915 an extensive outbreak of this insect occurred in Alberta, and covered a territory of about 3,000 square miles. The resulting study of the insect from an economic standpoint brought to light several interesting features in its life-history and habits.

The eggs are laid in September and October, mainly upon weedy fields. We were unable to find eggs in the field, but in all the experiments in which we reproduced natural conditions in so far as we were able the eggs were laid in the soil—near, but never actually upon, vegetation. This suggests, therefore, that even though the eggs of this species may be found on vegetation the majority of them are laid in the soil. We believe that this will be found to be true of several other cutworms which are described as laying their eggs exclusively on vegetation.

The eggs hatch in the autumn, and the young larvæ hibernate in the soil. Soon after the frost is out of the ground in the spring they come to the surface and feed upon the weeds. When the cutworms are numerous they soon destroy all of the weeds upon the fields where they hatched and have passed the winter. Then, like the Army-worm, they move off more or less in a body in search of more food.

Their general trend of migration, in all cases observed, has been towards the northwest. We believe that they are oriented by light. As in the adult stage these cutworms display a positive phototropism to artificial light, and also to subdued daylight, such as is experienced soon after sunset. Also, like the adults, they avoid strong daylight. The latter tendency causes them to remain below ground on bright, sunny days. It happens, however, that when the cutworms are sufficiently numerous to assume the migratory habit, they have been unable to obtain enough food to appease their hunger. Hunger causes them to migrate, and it may become so intense that it overcomes their aversion to exposing themselves to direct sunlight, so that they come above ground by day, and crawl rapidly in search of food. This search is haphazard. They are not making for any definite feeding ground, of which they have some knowledge. They crawl, therefore, in the line of least resistance—that is, away from the sun, or in a more or less northerly direction. We have disturbed adults hiding under clods at noon time, and they too, in nearly every case, flew more or less due north. In the evening, when the sun is low, its weakened light seems to attract, as does that of an artificial light, and the cutworms crawl towards it. It is at this time of the day that migration usually begins. Once more this agrees with the adult habits; for the moths begin to fly at dusk, and an examination, soon after sunset, of the windows of a barn shows that most of the moths of this species are congregated on the western windows.

The food plants include practically all weeds, field, and garden crops. Larvæ even ascended young Manitoba maples and ate the bark off the twigs, thus killing the trees. They are entirely superficial feeders, and never cut off plants below ground as do the common cutworms.

The pupæ are found in the usual earthern cells made by the Agrotine species.

The moths fly from the middle of June till the end of September or early October. They may æstivate during the hottest part of the summer, and so appear to be double brooded. There is, however, one brood only. During the first flight the ova remain undeveloped, but the moths feed freely and accumulate fat body. After the period of æstivation the eggs have begun to develop, and they are laid during the autumn.

The moths are a serious domestic pest, and gain access to well screened houses. Contrary to general belief, very few of them are attracted into houses by the lights. A lighted lamp merely attracts around it the moths already in the house. The majority of moths enter houses between the shingles or through cracks around doors and windows. They enter these crevices in the early morning for protection from the daylight, working so far in that many of them are unable to find their way out again. Many of these crevices communicate, by however devious a course, with the interior of the building and the result is that a number of the moths gain admission to houses from which the smaller house flies, which avoid dark chinks and crannies, are effectively excluded. The moths are attracted only from a short distance by light, and in this connection it may be mentioned that light traps in the fields proved to be an absolute failure. The majority of moths migrate to buildings soon after they emerge, and remain there until they are mature.

The destruction of the larvæ by poison can be accomplished with comparative ease. This is done most economically by the use of a poisoned bait applied to specially prepared furrows. In wet seasons a vertically sided furrow can be used but under the conditions prevailing in southern Alberta the soil is usually too dry for its construction without expensive hand labor. Under such circumstances it can be replaced by a dusty sided furrow, made by drawing a heavy log through a deep plough furrow. For bait we used either sweetened shorts, which proved to be far superior to bran, or some green vegetation, such as Stinkweed (*Thlaspi arvense*), or alfalfa, poisoned with Paris green. The cannibalistic tendency of these larvæ proved to be of great benefit, since the poisoned larvæ, which soon lined the treated furrow, were eaten readily by subsequent arrivals, and definite experiments proved that under these circumstances they themselves furnished a very effective poisoned bait.

The cutworms appear early in the season, before the spring grain is sown. If they are observed in large numbers in a field which is being prepared for seeding, extra care is taken to remove all traces of green growth, a poisoned furrow is prepared right round the field, and seeding is proceeded with as usual. The lack of food results in a rapid migration of the larvæ already on the field, and by the end of the week necessary for the germination and appearance of the crop, the majority of them will have entered a furrow and have been poisoned, while others attempting to enter the field from the outside also will be trapped. Sometimes it is advisable to make more than one furrow along the menaced side of the field, and if the season is so advanced that germination is rapid, it may be necessary to plough subsidiary furrows at intervals through large fields.

Fortunately, we have no evidence which would lead us to anticipate a frequent recurrence of the pest, and we feel that similar outbreaks to that experienced this year can be held in check by the control measures advocated above.

THE PRESIDENT: I think all will agree as to the very practical nature of Mr. Strickland's paper and at the same time its value on account of the very interesting points he brings up regarding certain biological questions. Mr. Strickland certainly won two victories in the West this past season. He won a victory over the Cutworms, and he won a more important one than that, the obstinacy of the farmer, who is always very chary about adopting any remedial measures from experts unless you can convince him by demonstration. The way he was able to break through that obstinacy on the part of those farmers who were not willing to accept advice unless they were shown is really one of the valuable lessons we learn from the method we now have of carrying out our work through the field stations. Secondly, the fact that Mr. Strickland had to begin the study right from the very beginning, and leave behind him all the previous historical matter regarding the treatment of Cutworms under other conditions and in other parts of Canada, shows what a difficult task he had. There are a number of points in his paper which might be the subject of a very interesting discussion; for example, the behaviour of the larva as compared with the behaviour of the moth. They behave practically the same both towards artificial light and towards the natural light of the sun. Apart from its practical interest, of course, this paper does bring forward very emphatically the necessity of studying the behaviour of insects, and I believe that in our practical work we are coming more and more to realize that we shall have to go in for behaviour studies in addition to the study upon which so much of our advice has been based in the past, that is, studies of the life-history. We have many instances of that, such as the recent work in regard to the Fruit Flies of various species and work in connection with the relation of the ants to the Corn Root Aphis, all of which tends to prove that life-history study only leads so far in many instances. That is one of the most important things that Mr. Strickland's paper brings out. The paper is now open for discussion, and I have no doubt that a number of the members would like to take up certain matters.

PROF. LOCHHEAD: Did Mr. Strickland say what effect the juice of lemon has upon the mixture as an attractant?

Mr. Strickland: We tried using the juice of both oranges and lemons when poisoning in the trench, but found that since the bait was not in competition with a growing crop there was no necessity to use it; and as a general rule we found that the fruit juices made very little difference. We have been using a series of cages sunk into the ground over a growing crop, 9 feet square, so that we can put in each a certain number of cutworms, apply poisoned baits, and tell exactly what our poisons are doing. We did some forty or fifty experiments in them this year with various poisoned baits, and generally about three days afterwards we would recover all of the larvæ, living or dead, from the soil, and in that way we were able to tell the relative values of the baits used. Here also we find that fruit juice has very little beneficial effect, and that cane molasses is very much inferior to beet molasses.

Mr. Winn: I would like to ask Mr. Strickland about the first stage of the insect, namely, the egg-stage. When the eggs were found were they attached in any way?

Mr. Strickland: We never found more than three together.

Mr. Winn: Did you notice where they were laid?

Mr. Strickland: Of course we disturbed them when we examined them, but we found that particles of earth were attached all around them, and therefore we concluded that they were laid in the soil rather than on the soil.

Mr. Winn: I have examined several of the eggs and it was very peculiar the way they were laid.

Mr. Strickland: Our examination of vegetable matter has been naturally far more thorough than that of the soil, and we have never found them on vegetation, so that we are rather forced to the conclusion that they are laid in the soil.

The President: Perhaps Mr. Gibson would have some remarks to make on this subject.

Mr. Gibson: I am afraid I can add very little to what Mr. Strickland has already said. He seems to be working under conditions peculiar to Southern Alberta. In the East, here, we frequently find the eggs of Cutworm moths laid on leaves, and even on the stems of trees, but we have not ourselves, as Mr. Strickland has, located any eggs in the soil in eastern Canada. In the case of the Variegated Cutworm, which was so abundant in British Columbia in 1900, the eggs were laid on the leaves and stems of trees, windows, verandahs, and even on clothes hanging out to dry. In regard to the control of cutworms in the East, we this year used the locust poisoned bran formula with good results. Twenty pounds of this, if spread properly, is sufficient for two or three acres.

Mr. Criddle: I would like to say that I have also been carrying on a few investigations in Cutworms during the past season, and I found that market gardeners near Winnipeg had very little faith in oranges or lemons. They had remarkable success by using both bran and shorts (the majority were in favour of shorts) and just molasses in addition, and my results seemed to bear out what they said.

Mr. Tothill: I would like to ask Mr. Strickland if in connection with the Noctuids there is any special machinery in connection with any of the ovipositors for laying eggs beneath the soil?

Mr. Strickland: Whenever we disturbed moths in the day time they were always beneath clods and so beneath the soil.

Mr. Wilson: I would like to ask Mr. Strickland about what time the Cutworms appeared in Alberta this summer?

Mr. Strickland: They appeared as soon as the frost was out of the ground, the very first record being of larvæ attracted to light at the Provincial Jail on April

7th, and on about April 10th we had an account from the country where we found them plentifully.

MR. WILSON: In 1900, about the 15th June, I received a report of damage by potato beetles up North and I proceeded there, but could find no potato beetles of any kind, and I had good evidence that cutworms were present.

THE PRESIDENT: If there is no further discussion on this paper we shall now bring this session to a conclusion.

MR. GIBSON: Several of the members undoubtedly would like to spend some time looking over our collections here, and as I think we have plenty of time for all the papers on the programme to-morrow morning, I would move that the session begin at 9.30 instead of 9.00 o'clock.

MR. TOTHILL: I second that motion.

THE PRESIDENT: To-night we are to have the privilege of hearing a public lecture from Dr. H. T. Fernald, State Entomologist of Massachusetts. Dr. Fernald has been most kind in stepping into a breach which was made by the unfortunate accident to Dr. Howard, who would otherwise have delivered this lecture, and I take it for granted that everybody here will be there to-night as we ought to give Dr. Fernald a good audience, and I hope the members here will do their best in bringing their friends to hear Dr. Fernald. The lecture starts at 8.00 p.m.

The meeting is now adjourned.

THURSDAY, Nov. 4th.

EVENING SESSION.

LIFE ZONES IN ENTOMOLOGY AND THEIR RELATION TO CROPS.

H. T. FERNALD, AMHERST, MASS.

From the time when the late Alfred Russel Wallace published his epoch-making volumes on "The Geographical Distribution of Animals," this subject has been one of extreme interest. Wallace used his discoveries in this line as evidences of evolution, and provided many able arguments to support the theory from that source. The possibility of a practical application of distribution to agriculture, however, seems not to have received consideration by him, and it was apparently left for Dr. C. Hart Merriam to present this phase of the subject, though in a somewhat general way, in his paper on "Life Zones and Crop Zones in the United States," about a quarter of a century later.

Two years ago, Dr. E. M. Walker, in his presidential address before this society, discussed at some length the life zones as they are found in northern North America, and therefore only a brief reference to this phase of the subject is necessary at this time. Studies of the distribution of plants and animals all show that on any continental area, belts running from east to west across the country are inhabited largely by the same forms, while as we go north or south to the limits of these belts, we find other species beginning to present themselves, and these increase until finally we are surrounded by a fauna and flora almost entirely different, and belonging to a different belt.

Such belts constitute the so-called life zones and these are grouped into regions, that covering the tropical portion of the continent being called the Tropical Region, that next the north the Austral Region, and the northernmost, the Boreal Region. Naturally we are interested mainly in the last two of these areas.

Canada is, of course, largely within the Boreal Region, but the differences within her territory are such that three sub-belts, called zones, are easily recognizable. On the north, beyond the limit of the growth of trees, we find corresponding changes in plant and animal life, establishing the Arctic Zone of the region. Here are typically Arctic plants and such animals as the Arctic fox, polar bear, musk ox, and ptarmigan. South of this, stretching across the continent from Labrador to Alaska, and southward along the tops of the Rocky Mountains is the so-called Hudsonian Zone. Its southern limit extends from near the mouth of the St. Lawrence River to the southern end of Hudson Bay, thence passes northwest to near Great Slave Lake, then down the Mackenzie River to about 65 deg. latitude, after which, influenced by the mountainous heights, it extends again to the south to about latitude 55 deg., sending narrow tongues farther south along the mountain tops. As it approaches the western ocean, however, the moderation of climate due to the Kuro sivo, or Japanese Gulf Stream, makes its influence felt, and the southern edge of the zone is driven north and is only able to reach the western shore of the continent about five degrees farther north than it was when the effects of the ocean came within reach. As neither the Arctic nor Hudsonian zones of the Boreal Region has great agricultural value, we now turn to the third zone of this region—the Canadian—which with certain exceptions occupies the rest of the Dominion of Canada and a portion of the United States. Here we must look for the greatest agricultural returns and one of the best opportunities for the utilization of crops not as yet grown.

The Austral Region occupies but a small portion of Canadian territory, but what it does occupy is of great value, for here it should be possible to produce crops not raised elsewhere in the Dominion, and to produce to perfection crops only partially successful in the Canadian Zone. Like the Boreal, the Austral Region is divided into three zones, the northern one being known as the Transition Zone. How accurate our knowledge of the area occupied by this zone as shown on the map is, may be questioned, but a strip around the Bay of Fundy and along the shore of Lake Ontario, and the Southern parts of Manitoba, Saskatchewan, and Alberta, besides the shore belt in the region of Vancouver Island, are believed to belong to this section.

Next south comes the Upper Austral, and this appears to be present in Canada only as a narrow strip along the shore of Lake Erie. How correct this is must be determined by future investigation.

It is a safe statement that Life Regions and Zones are always limited by barriers, though these may be of many kinds. Every kind of animal and plant has an optimum temperature at which it thrives best. As we depart from localities where this is true, and pass to the north, we will reach a latitude where it can no longer exist, while if we pass to the south the same will hold. Sometimes the limits will be established, not by temperature but by absence of food or by a change from a moist to an arid climate or the reverse. A mountain chain of considerable height may so affect temperature that forms reaching it are unable to cross and enter a continuation of the same zone beyond. Near the shores of our continent the influence of the ocean is a modifying factor, and others might also be enumerated, all affecting the arrangement of the regions.

Evidence indicating the limits of these zones is gathered by a study of the plants and animals present. Many plants found only a short distance south of the international boundary disappear as we pass northward, and with them disappear animals feeding on those plants, unless satisfactory substitutes can be found. The cold of winter holds many forms in close agreement for their northern limit with certain isothermal lines, and by a study of these and other factors, a general understanding of the zonal areas can be obtained.

At the present time investigations on this subject are mainly by preparing faunal and floral lists for different localities, particularly from places presumed to be near the borders of the zones, and as a whole the latest results seem to indicate that the Upper Austral Zone extends farther north than was formerly supposed to be the case. It is, of course, recognized that no absolute line separates the zones, but that they overlap somewhat along their edges, leaving more or less of a "debatable ground," but despite this, approximate limits have a significance when it comes to the selection of the most successful crops to raise in any locality, and even local modifications are worthy of consideration.

The speaker regrets a lack of knowledge of local conditions of Canada as bearing on this point. Certain examples from cases with which he is familiar, however, may be suggestive and be possible of application here.

The State of Massachusetts is mountainous at its western end, numerous peaks reaching a height of more than 2,500 feet, and that whole portion of the state is more than a thousand feet high. East of this the state is crossed by the broad Connecticut River Valley, where, except for a few hills, the elevation is everywhere less than 500 feet. The central part of the state is higher again, the general elevation of the land except for narrow grooves cut by streams, being over a thousand feet. The eastern third of the state, however, is all less than 500 feet above sea level.

So far as elevation goes, therefore, the eastern part of the state and the Connecticut Valley should have much in common. Such differences in elevation in the state as have been indicated should not be of such importance as to affect apple raising, for instance, but they do result in the appearance of minor differences which all have their effect.

But even two such similar areas as the eastern end of the state and the Connecticut Valley have their differences. Nearness to the ocean has its effect in the former case, moderating the temperature somewhat in winter, and slightly checking excessive heat over extended periods in summer. But when southeastern Massachusetts is considered, yet another difference is found. Here the influence of the Gulf Stream as it sweeps northward modifies the winter and lengthens the fall, preventing frosts until much later than only a few miles farther inland.

The Gulf Stream is itself a somewhat variable factor. From time to time its course changes, sometimes swinging in quite close to the land, while at others it turns more out to sea, thus having less effect. In general, however, the result is that crops normally grown only much farther south can be successfully raised on Cape Cod and along the shore towns of the southern part of the state, besides insuring safety to late planted crops coming onto the market after the regular season has ended.

Small factors sometimes prove to be of considerable importance in establishing the limits of life zones, and this is illustrated by the Holyoke range of mountains in the Connecticut Valley. This range is by no means a continuous one; but its general trend is across the valley with an average height of perhaps a thousand feet. In spite of its numerous breaks which would seem to render it of no importance as a line of separation, we find many forms of life extending from the south as far as this range but no farther, and the season on the northern side of the range is about ten days later in spring than on the southern side. The steep northern slopes of the mountains are well covered by snow during the winter, and this is not quickly reached and melted by the sun in the spring, thus delaying the season north of the range. During the winter, too, increased cold results, and it is probably this which prevents a farther northward spread of the forms which reach the southern slopes, by establishing a winter temperature which they are unable to withstand. During the summer, northward migrations can and sometimes do occur, but the cold of the winter following is always sufficient to destroy these marginal settlements, leaving the northern limit of occurrence of these forms where it was before.

Closely related to the questions of distribution of our native animals and plants, are those of introduced forms of life. The Elmleaf Beetle, which reached this country nearly three-quarters of a century ago at Baltimore, has now spread far to the northward, and how much farther it can go is a question of considerable importance. It thrives in the Upper Austral Zone, but is noticeably absent in the highlands of the Pennsylvania mountain region, though it is present again west of them. To the north it has caused serious loss to the elms of New England, resulting in the appropriation of large sums for spraying of the trees to protect them from its ravages. Careful studies of this pest in Massachusetts show that while a serious menace to the life of the elms in the southern part of the state and in the river valleys, it becomes of little importance in the higher and northern parts, and many towns which formerly appropriated money for the protection of their elms from this insect have now learned that this was unnecessary, as the trees would suffer but little at most, in any case.

With the San José Scale similar facts are now coming to light. This pest finds the best conditions for its life in the Lower and Upper Austral Zones, where it has caused the loss of many millions of dollars. Even in the Upper Austral territory of Massachusettes, it is one of the most destructive enemies of the fruit-grower. As we pass into the Transition Zone, however, its ravages become less severe, and by the time the centre of this zone has been reached, it is of only medium importance. In this case, it has seemed to those studying this problem that this insect was originally limited by the Upper Austral, but has gradually acquired some degree of resistance to lower temperatures and has thus been able to extend into the Transition Zone. Whether this resistance of cold will continue to develop until it becomes a serious insect in this entire zone is a question which cannot now be answered. At least, it points out the possibility of the acquirement of resistant qualities as a factor which must be taken into consideration. The speaker has watched with much interest a small colony of these insects which about fifteen years ago was brought on nursery stock to a point near where the Transition Zone meets the Canadian. Here from year to year the insect has reproduced just sufficiently to maintain itself, doing no injury, and "eking out a miserable existence" and nothing more.

The Asparagus Beetle and numerous other examples might here be considered as illustrating the significance of life zones in their relation to the limits of spread of our insect foes, but time for their consideration is inadequate.

With life zones divided by mountain ranges we find that it is not usually the case that the same forms occur on both sides of the barrier. When this does happen, two explanations offer themselves. The barrier may be a recent one, at least geologically speaking, having arisen after the zone had been occupied by the forms concerned. Or the barrier may be a less complete one than it was supposed, and these forms have in some way succeeded in crossing it. More often the animals on the two sides are not the same, though they may play similar parts in Nature's economy, and again two explanations are possible. Where two similar but different forms occur, one on each side of a barrier, it has been suggested that a common ancestor of the two had established itself over the entire zone before the barrier was formed, and that development on the two sides since has been along sufficiently different lines to produce different species. The Peach Borer east of the Rocky Mountains, and its close relative, the Pacific Coast Peach Borer, on the western coast, are considered an example of this. Many forms, however, show little close relationship but much similarity to Old World forms, and here geology steps in to provide an explanation.

There is much evidence that in past ages the northern part of the world's surface was much warmer than it now is, and also that there were more or less complete land connections between Europe and North America on the east, and Asia and Alaska on the west. It is noticeable that many forms of life in the northeastern part of this country find their closest relatives among European forms, and similarly that many of our western forms closely resemble those of North-Eastern Asia. From these facts it seems at least probable that differences in the life of the same zone found on two sides of a north and south barrier may be accounted for as being the results of migration from the two opposite ends of the Eurasian continent.

Life zones then mean, not the areas continuously inhabited by a certain list of forms, but territory having fixed standards, which meeting the needs of animals and plants, able to live under such standards, can be populated by them if means of access is provided.

It has been said that certain places in Africa are perfectly fitted for some American forms of life. If this be correct, such American forms once placed there would establish themselves and thrive in their new home, the only difficulty being that of getting them across the ocean in the first place. This may remain a difficulty for years, but, so far as North America is concerned, the arrival of new forms from other countries is not only possible, but is actually occurring, and if favorable conditions are found on arrival, or, in other words, if proper life zone conditions and proper food are at hand, the establishment of new animals and plants in our land is certain.

Some of these arrivals in the past have been desirable, but certain it is that many have proved veritable pests. It is stated that about seventy-five of our one hundred worst insect pests are of foreign origin, and, in spite of all systems of inspection and care, new ones somehow creep in and establish themselves before we are aware of their presence.

To prevent this seems hopeless under our present methods, and the recent development of the nursery business, bringing in millions of all kinds of plants from all parts of the world, harboring insects many of which it may be difficult or impossible to find by any inspection, raises the question whether it would not be wise to absolutely prevent the importation of all plants from foreign countries, in order to protect ourselves from the pests of other lands which otherwise might join forces with those already here, in the destruction of our crops.

MORNING SESSION

Friday, November 5th.

The President: The meeting is now called to order and I intend to postpone the first item on the programme, that is, "Election of officers, etc.," and instead to ask Mr. Morris to read his paper on "Fresh Woods and Pastures New."*

Mr. Morris's paper was read.

Dr. Hewitt: I am sure I am voicing the sentiments of the whole meeting when I say how pleased we are that Mr. Morris was able to come to this meeting and deliver one of his charming papers. It occurred to me, as Mr. Morris was reading his paper, what a pity that he could not be given charge of an expedition such as Bates had in South America, what charming accounts of those entomological journeys we should have when Mr. Morris returned. This paper is now open for discussion, if any of the members care to ask Mr. Morris any questions regarding his captures.

I hope, Mr. Morris, that you will take this silence as indicating that your paper was so fully detailed by you that no one wishes to discuss it. We will now pass on to the next paper, by Professor Lochhead, on "Some Notes on Nose and Other Bot Flies."

SOME NOTES REGARDING NOSE AND OTHER BOT FLIES.

Prof. W. Lochhead, Macdonald College, Que.

1. Nose Flies.

In connection with the "Farmer's Friends and Foes" department in the *Family Herald* and *Weekly Star* several interesting letters were received by me from the West regarding *Nose Flies.* I consider the information obtained of sufficient importance to bring before this meeting, for it became evident when I looked up the literature available that entomologists as a rule have much to learn regarding this group of flies.

The correspondence referred to began innocently enough through a question asked by a Saskatchewan subscriber; "Does the Nose fly that torments horses in summer time sting or bite the horse, or what makes them so afraid of the flies?" I replied as follows:—

> Nose flies are a species of horse bot flies and have a peculiar habit of laying their eggs round the lips of horses, and the nostrils. For this reason they have been termed "Nose Flies." We all know that horses have an instinctive dread of this fly, and seem to recognize its presence. While these flies may appear to sting, they cannot do so, for they have no sting. Their mouth parts are aborted. However, this fear of the bot fly has been bred into the bone of thousands of generations of horses, who have suffered the effects of the bots in the stomach. There may be something in the fact that the bot fly resembles a wasp or a small bee and that the horse cannot very well distinguish between these insects which sting and the bot fly which does not sting. Personally, I am of the opinion that horses know instinctively that this insect is harmful to them. There are many things that we cannot explain, and this instinctive dread of nose bot flies is one of them.

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*This paper will appear in the *Canadian Entomologist*, Vol. XLVIII, No. 5, May, 1916.

My reply led another Western reader to make a spirited reply to my statement that the bot flies cannot sting either with its mouth-parts or with its ovipositor. He says:—

> My experience with "nose flies" that annoy horses dates back eight years. Previous to that time they were unknown in the district. A bunch of horses were brought in from the United States the year before and from them I think we obtained this pest. Of course we always had the long-tailed bot-fly, but this bob-tail is a curse both to horses at work and in pasture. Work horses can be given some protection in the shape of nose covering, but the poor horses outside cannot even feed in the daytime for them. If you could see the poor beasts huddled up together stamping, rubbing, etc., I am sure you would not think the laying of an egg by these pests so simple a matter. Come and hitch up a six-horse outfit without any protection sometime this coming summer and you will change your mind. Anyone who will take the trouble to examine these bob-tail bot flies will notice on the tail end a pair of tweezers when pressed slightly. It is from these tweezers the trouble arises.

In my reply to correspondent No. 2 I suggested that perhaps the real culprit was a Tabanid for these insects are known as Gad-flies, Breeze-flies, Greenheads and Ear-flies, but asked for specimens. Correspondent No. 2 was good enough later to send a few specimens of the Nose flies and made further observations regarding their habits:—

> These pests have been some weeks later making their appearance this year, owing I presume to the late frosts. I think the description you once gave, namely, red-tailed bot-fly, was fairly accurate, but strange to say I have looked very closely for their eggs but have failed to find any—so different from the ordinary long-tailed bot, which distributes its eggs promiscuously. On squashing an ordinary bot fly one finds numberless eggs, but in these I have failed to see any. The habits of these nose flies are to hover around a foot or so above the earth, when they make a dart upwards and try to hit the horse on the lips or nostrils; it also seems to dig its hind part similar to a bee or wasp when stinging an object. It rarely hits but once at a time, when it seems to disappear for a few seconds, then comes again. I have examined its rear end for stinging apparatus, but can only see what to me appears a pair of tweezers. We have all the other kinds of horse flies you mentioned, but a horse will calmly endure being chewed up with the spotted winged horse flies, bull dogs and the rest of that family, but let one of these nose flies strike and he is up in the air at once and has to rub his nose on something or other. As I mentioned in my previous letters it is only a few years since they made their appearance in this district and I have heard that there are parts of this province where they have not yet made their appearance. They are the greatest pest we have got on horses. I think the Royal Humane Society should get busy and make all owners provide some building in which any stock in pasture could go in for protection. I have a pole and straw shed which I put up for winter and the straw has settled down a little, which leaves an air current at the top of walls. My stock appreciate it and it is also a protection from the bull dog flies, too, which are a great annoyance to cattle as well as horses. These nose flies don't touch cattle.

My reply was as follows:—

> We were very glad to get four specimens of nose flies from Saskatchewan, for their arrival sets at rest the question of the identity of the flies that bother the horses so much in the western provinces. They are nose flies (*Gastrophilus nasalis*), and are one of the species of horse bot-flies. Now our friend S. H. differs from us on the power of stinging these nose flies possess. We maintain that these flies do not and cannot sting, for they have no stinging appliance. In all kinds of flies that sting the mouth-parts are modified to form a stinging or piercing apparatus; on the other hand, in all the kinds of bees and wasps that sting the egg-depositor at one hind end of the body is modified for piercing purposes. Now, as bot-flies are true flies we would naturally expect their mouth-parts to show piercing appliances if they can really sting, but examination reveals no such appliances. Moreover, the egg-depositor at the hind end of the body is rather long, but it is too soft and flexible to serve as a stinging instrument.
>
> If these bot or nose flies cannot sting, why do they cause such panic among horses? The answer is, we believe, the persistent efforts of the flies to deposit their eggs on

the hairs of the front legs. They resemble a bee or a wasp to a considerable extent, even to the humming noise, and their sudden darts coming continuously and persistently get on the horses' nerves and set up a panicky state of mind. The cattle or warble or bot fly is another instance where a fly that cannot sting causes cattle to go careering through the fields in a panicky condition. The real biting flies like the horse fly do not seem to produce the same effect, for the reason we suppose that once the horses get rid of it they have rest for a while. There is no doubt as to the name of the flies sent, and it is also certain that they do not sting. Three of the specimens submitted were males, hence would not have eggs.

Later still, a third correspondent from Saskatchewan writes me regarding Nose flies and gives further particulars as to the differences between the Nose fly and the Bot fly. He says:—

I have been reading in the issue of July 28 an article on nose flies. As the nose flies are a very troublesome pest among horses, I would like to add my mite of knowledge concerning them. Now they cannot be the same flies that deposit their eggs on the legs because they are much smaller and darker in color, and the mode of laying the egg is different; the ordinary bot-fly keeps buzzing and depositing her eggs (which are yellow) continuously; whereas in the nose fly it strikes upward swift and wickedly and then disappears, to return again possibly in half a minute; the egg is black. One fellow struck me on the back of the hand last summer and left an egg which attached to a hair; there was no pain, though the wicked way it does the trick is quite enough to scare a person or a horse either. When there is protection on the nose of the horses (rags are commonly used and wire screens are sold to cover the nose), they will strike at the person; often I have had them hit the underside of the brim of the hat.

My reply was as follows:—

The correspondence regarding nose flies has brought out much important information regarding these pests. Our friend (W. B.) tells us something really important in the way of distinguishing two kinds of bot flies of horses. It is likely, however, that there are at least three kinds of bot flies in the West, and this fact will account for the difference noted by the various observers. There is first of all the "common bot fly," which deposits its yellowish eggs on the legs and is of a general reddish brown color. The eggs may be deposited on the fore legs, knees and shanks. A second form is what is known as the "nasal fly," specimens of which we identified in our last note on nose flies in these columns. We beg to note a clerical mistake which we made in stating that they deposit their eggs on the hairs of the front legs; this should have been "on the hairs of the lips and the margins of the nostrils." This insect is smaller than the first, has white eggs and is of a darker color, but still with a considerable number of brownish hairs. The third form of bot fly is the "red-tailed bot fly." This has about the same general color as the nasal fly, but is not so large and deposits its eggs on the lips of the horses. The eggs are darker than those of the first or second. It must not be supposed, however, that the "red-tailed bot fly" is the only red-tailed bot fly. A confusion may arise here; there are different bands of color on the abdomen of both the nasal and the red-tailed bot fly, the bands being very much alike in both—a yellow band in front, black in the middle and orange on the last. The term "red-tailed bot fly" is, therefore, not a good one to use, because the nasal bot fly is also red-tailed. These facts regarding the three forms of bot flies may account for the differences observed by our correspondent, as we have already stated. There are other differences, of course, which are revealed on close examination under a magnifying glass or a microscope, but the foregoing are sufficient to identify them. We should be very much indebted to our readers in the West if they could send specimens of bot flies to us so that we may be able to give further information when questions are answered.

A fourth correspondent at this time contributes his mite as to the best treatment against nose flies:—

There is an objection to the use of rags tied over the horse's nose on account of difficulty in breathing. I have tried the following remedy with much success: Mix about 10 cents worth of oil of tar in machine oil (but other oils would be better), and wipe lightly around the muzzle of the horse—but use it very sparingly—whenever flies make an attack. I keep a bottle among the implements and flies never come near the horses. Mosquitoes dislike this substance also.

A fifth Saskatchewan correspondent writes as follows:—

I would like to add the following information, which I will vouch for being correct. The nose fly appeared in this district some ten years or more ago, brought I expect from the States or Mexico. In size, shape and color it closely resembles the bot fly, and is often mistaken for it, but it is a trifle smaller and more grey. The principal difference, however, to the horse and stockman lies in its method of depositing its eggs. The bot fly buzzes incessantly up and down the animal's legs, sticking a yellow-white egg on the hair every other moment, mostly below the hock or knee. In distinction from the bot fly, the nose fly uses its ovipositor like a hypodermic needle. It flies very swiftly back and forth, poises itself for a moment as though to judge place and distance, and then, darting upward, stabs a *black* egg into the lip or chin of the horse and retreats as swiftly, only to return at the next suitable moment. The horse can hear it and awaits the attack with nervous apprehension. On feeling the needle-like thrust it starts violently and rubs its lips or nose on the grass or against another horse. Often horses on the range will be seen standing with their noses buried in each other's manes or resting on another's back. I never saw a nose fly draw blood, and I think the "ear fly" referred to in the article is a very small grey-black fly that bites principally in the ears, across the chest and around the sheath. These are distinct from the flies, like very diminutive house flies, which congregate around animals' eyes. There is also the "deer fly," about the size of the house fly, but having a speckled or mottled appearance, whose wings when at rest stand out, giving it a triangular shape. Also the huge fly as big as a wasp, locally known as the "bulldog." The latter flies bite with nippers and generally draw blood. There is also another pest called the heel fly which I have not studied yet. Some people claim it is identical with the nose fly. It attacks the heels of cattle, which take refuge in water when possible. It is a common sight to see one or more individual animals break from a bunch or off the feeding ground and stampede for water, brush or, when neither is handy, a buffalo wallow or washout. Animals will be found thus upwards of a mile from any other cattle. In a country so large, individual attempts to destroy any of these vermin seem hopeless; but if any means could be devised to co-operate for their destruction, the relief would be tremendous both to man and beast. Of all the flies the "nose fly" is perhaps the worst, and we have to use some kind of porous net over our horses' noses, as referred to in the quoted article.

A reader from Alberta (Correspondent No. 6) writes as follows:—

I have been very much amused and interested at your articles on nose flies and bot flies. I imagined that every farm boy of an inquiring nature and over ten years of age knew all there was to know about those little pests. I have been a neighbor of theirs for the past thirty years and consider I am about as well acquainted with their habits as the ordinary man. I was a boy of thirteen when I first made the nose flies' acquaintance. I used to lead an old blind horse to the cultivator; on calm, hot days the horse would suddenly stand on his hind legs and start pawing the air with his front feet, sometimes bruising me in his flurry, so I naturally started in to investigate with a boy's curiosity, and the only thing I could notice for a while was a dark object about the size of a buckshot come from somewhere near the ground, strike the horse on the lip and immediately fall to the ground. One thing I noticed in particular was that when they struck the horse they were upside down and their tail struck in advance. My idea was that they were a variety of bee. The first one I caught I examined very closely for a sting but could not find any; then I started to squeeze the rear end to see if there were any eggs in the oviduct and did not find any eggs, but to my surprise I squeezed out two stings just below the oviduct shaped exactly like the mandibles of an ant, but considerably stronger and sharp as needles. So I came to the conclusion that was the cause of the horse's antics. The nose flies that I was acquainted with in the East were about the size of a house fly but shaped like a bee. You say that only bees have stings in the tail, and I believe you are right; but when you claim that a nose fly is a bot fly I think you are off. The nose fly is one branch of a large family of stock bees, and the bot fly may also be a branch of the same family, but it is the only one that lays the yellow egg which hatches into the bot inside the horse's stomach, and it will lay eggs on a horse from heels to ears and sometimes on cattle. It appears to be the strongest flier of any of the family and also the best known. Since coming to Alberta I have made the acquaintance of several other members of the stock bee family. First I will mention the brown-tailed light yellow nose fly; it is about the size of a blue-bottle fly but shaped like a honey bee. It also carried heavy mandibles just below the oviduct; they are sheathed in the body and cannot be seen unless the body is pressed between the thumb and finger, when they expose themselves.

Then there is another with a light yellow body, about the size of the female bot, which I imagined was the male bot; it also has a pair of mandibles, but they are frailer than those on the nose fly.

Now we get to the heel fly, which belongs to the same family and is the largest of the family that I know. It is about the size and shape of a small honey bee and carries the heaviest set of mandibles of any of the stock bee family; it is also the poorest flier; it hovers around in the grass or near the ground on calm, hot days, and darts up, striking the cattle on the first place it reaches, generally from the heels up to the hocks and sometimes on the rump; then up goes the animal's tail and it bolts. If there is a four wire fence in front of the animal it goes right on through, while the fly calmly drops to the grass and sails along until it comes to the next cow or steer, which also throws up its tail and has business elsewhere. By that time all the cattle have taken the hint and disappeared.

Another one I captured near the horses one day about as large as the heel fly and the same color; the only difference I noted was that its mandibles were jet black and very strong, while all the rest were brown. One thing I noticed with all of these insects is that they are always worse on hot, calm days and are very weak fliers, never appearing when there is any wind, excepting the bot which is with us all summer.

A correspondent (No. 7) from Chatham, Ont., writes:—

I think your correspondents of July 28th and September 1st are in error about what they call nose flies, as the flies do not strike on the horse's nose but underneath, just back of the opening of the jawbone. I have caught scores of them by placing my hand beneath the horse's chin. They do not deposit eggs, as they are males of the common bot fly. The eggs that are on the lips were not deposited there, but adhered when the horse was rubbing his legs, as the horse does not use the tongue for that purpose. The difference in colour of eggs can be accounted for in this way. When first deposited they are yellow, but turn darker until hatched; then the shells which still adhere to the hairs get quite light.

2. WARBLE FLIES.

For the last two or three years reports have reached us from Chateauguay and Huntingdon Counties that certain flies were very troublesome on the dairy herds in pasture during June and early July. It was asserted that they stung the cattle and chased them about the fields. This summer a specimen of the pest was sent me, and on comparing it with type specimens of Warble flies sent me by Dr. Hadwen, of British Columbia, I identified it as *Hypoderma bovis*. Dr. Hewitt, to whom I submitted the specimen, corroborated my identification.

The explanation of this outbreak of *bovis* in the Chateauguay-Huntingdon district is clear when it is known that a large importation of cattle from Scotland has occurred annually for many years. The breeders of this district admit that warbles on the backs of the cattle are more common now than they were a few years ago.

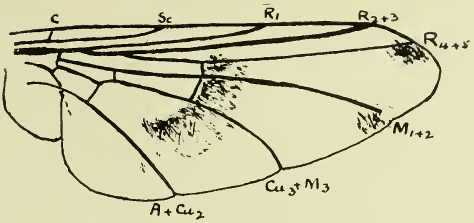
Following is a table which may be of service in identifying the common genera and species of the Oestridæ.

OESTRIDAE.

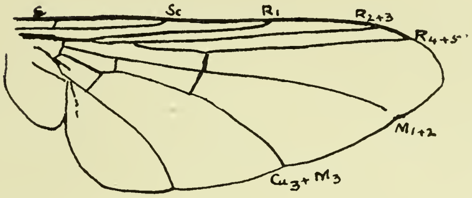
(Bot Flies.)

Common genera and species:

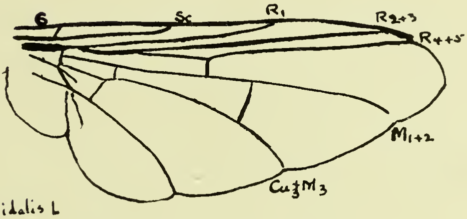
a. Costal vein ends at tip of R4+5; M1+2 is straight, not reaching the margin, and cell R5 wide open; squamae small, arista bare; ovipositor elongate. *Gastrophilus.*
b. Wings with spots and smoky median cross band. *G. equi* (horse bot fly).
bb. Wings without spots.
c. Posterior cross-veins (M-Cu) beyond the anterior cross-vein (R-M); legs blackish brown. *G. hæmorrhoidalis* (red-tailed bot fly).



G. equi Clk

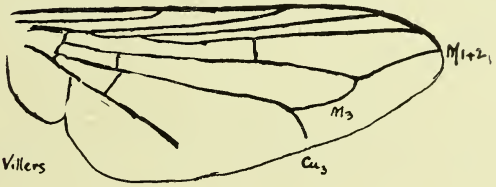


G. nasalis

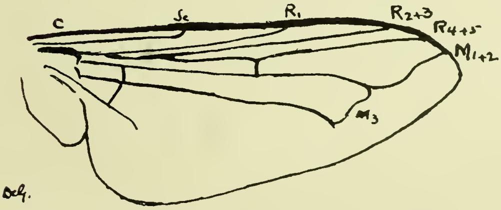


G haemorroidalis L

Wings of *Gasterophilus.*



H. lineatus Villers



H. bovis Deg.

Wings of *Hypoderma ilneata* and *H. bovis.*

cc. Posterior cross-vein opposite and nearer than the anterior cross-vein. *G. nasalis* (nose fly).
aa. Costal vein ends at tip of M1+2; M1+2 with a bend; cell R5 much narrowed or closed.
b. Facial grooves approximated below; cell R5 closed and petiolate. *Oestrus.*
bb. Facial grooves far apart; squamae large, ovipositor elongate. *Hypoderma.*
c. Prothoracic band of yellow hairs, mesothoracic band of brownish black hairs; media 3 sinuate; legs black with black hair; tips of hind tibiæ and tarsi yellowish brown. *H. bovis.*
cc. Thoracic band of hairs brownish; media 3 rounded; tibiæ and tarsi yellow; femora black. *H. lineata.*

THE PRESIDENT: We are pleased to have Professor Lochhead's paper in our Proceedings, because this is a group of insects which is gradually coming to the front more and more. It is very apparent that, both in the case of the Nose Flies attacking horses and in the case of the Warble Flies attacking cattle, these insects are becoming far more frequent. Our own correspondence files would display a somewhat similar series of letters as Professor Lochhead has read here. and the farmers who write to us about these things are very confident about their own observations and their own knowledge, as a rule. In regard to a brief note that Professor Lochhead mentioned about warble flies, I believe what he says is quite true, that we can trace the increasing prevalence of *Hypoderma bovis* in this country to the importation of cattle. In the old days the only species recognized in this country was *Hypoderma lineata,* which was considered to be a truly native species, but more recently, owing to the investigations of Dr. Hadwen in British Columbia and my own enquiries from the Branch here, we were able to show that *bovis* occurred in this country in addition to *lineata,* and further that *bovis* was pretty widely distributed, particularly in the Province of Quebec, and it is on this suspicion that Dr. Hadwen has based most of his very valuable investigations, but before passing on to this paper I think there are a number of points in Professor Lochhead's paper which might be discussed. We might discuss the two papers together.

PROF. LOCHHEAD: Since the two papers deal with almost the same subject, I think it would be preferable to have the discussion on the two papers at the same time.

DR. HEWITT: We shall now have Dr. Hadwen's paper entitled "Further Notes on the Warble Fly, *Hypoderma bovis.*"

Read by Mr. Treherne.

THE SEASONAL PREVALENCE OF *HYPODERMA BOVIS* IN 1915, TOGETHER WITH OBSERVATIONS ON THE TERRIFYING EFFECT *H. BOVIS* HAS UPON CATTLE, AND LESIONS PRODUCED BY THE LARVA.

SEYMOUR HADWEN, D.V.SCI., AGASSIZ, B.C.

The observations and experiments on *H. bovis* which were conducted at Agassiz this year, are all preparatory to the work which is contemplated for next year, on the prevention of egg laying and destruction of larvæ.

A previous paper has been written on the seasoned prevalence of *H. lineatum.* It is remarkable that so little is known about the seasonal activity of these flies, and if any treatment is to be undertaken it is absolutely necessary to know when they come and go. As I have already pointed out, the statements made by the European writers about the length of the season, especially for *H. lineatum*, are very vague.

The following table gives a complete record of the observations. The cattle, ten in number, were kept in a field directly in front of my laboratory. The animals were under almost constant observation. Whenever they were seen running, either myself or assistant went out to look for flies. If flies were noticed in the morning, then no further trouble was taken for that day. It is of course possible that we may have failed to observe them on some occasion or other, but this seems hardly likely, seeing that *H. bovis* invariably causes alarm among cattle.

The most likely error made was in the catching of flies, but these were mainly caught when they were abundant. It may be that on one or two occasions the flies which were taken would have lived over night and attacked the cattle on the following day. The only dates on which this may have occurred was on June 15th and 22nd. The meteorological records were kindly supplied by Mr. Moore, Superintendent of the Experimental Farm. In comparing them with my records, I was delighted to find that the changes of temperature coincide almost perfectly with the appearance and disappearance of the flies.

THE SEASONAL PREVALENCE OF HYPODERMA BOVIS IN 1915.

June.	——	Sunshine.		Rain.	Temperature, °F.	
		Hrs.	Min.	Inch.	Max.	Min.
1....	Cattle quiet, no flies..................	5	42	.47	64	48
2....	“ “	1	48	......	62	49
3....	“ “	2	54	......	72	42
4....	“ “	11	06	......	78	43
5....	Flies seen, cattle running............	11	54	......	82	50
6....	1 *H. bovis* taken......................	7	24	......	81	52
7....	Cattle quiet, no flies..................	2	00	......	65	47
8....	“ “	Dull		0.8	64	46
9....	“ “	1	18	......	64	51
10....	“ “	5	30	......	59	45
11....	“ “	......	18	.6	58	46
12....	“ “	1	00	.35	64	51
13....	Flies seen, cattle running............	......	18	......	67	50
14....	1 *H. bovis* taken......................	4	30	......	70	53
15....	Cattle quiet, no flies..................	8	36	......	78	55
16....	“ “	2	42	......	67	51
17....	“ “	Dull		.65	64	50
18....	“ “	......	54	.06	62	46
19....	“ “	Dull		.05	64	47
20....	1 *H. bovis* taken......................	5	54	......	67	45
21....	5 *H. bovis* taken......................	11	48	......	81	43
22....	2 *H. bovis* taken......................	11	42	......	82	43
23....	Cattle quiet, no flies..................	1	06	.02	74	46
24....	Flies seen, cattle running............	3	24	.03	78	46
25....	“ “	2	12	......	76	45
26....	Cattle quiet, no flies..................	Dull		.05	70	47
27....	1 *H. bovis* taken......................	3	42	......	76	46
28....	6 *H. bovis* taken......................	9	24	......	80	43
29....	Flies seen, cattle running............	11	36	......	84	48
30....	2 *H. bovis* taken......................	10	48	......	91	49
July.						
1....	Flies seen, cattle running............	11	36	......	93	56
2....	“ “	11	42	......	89	55
3....	Cattle quiet, no flies..................	11	18	......	84	56

THE SEASONAL PREVALENCE OF HYPODERMA BOVIS IN 1915.—*Continued.*

July.	—	Sunshine.		Rain.	Temperature, °F.	
		Hrs.	Min.	Inch.	Max.	Min.
4....	Flies seen, cattle running	10	48	......	82	59
5....	“ “	4	42	.03	77	52
6....	Cattle quiet, no flies	1	42	.18	76	55
7....	Flies seen, cattle running	9	18	.02	84	43
8....	Cattle quiet, no flies	6	6	.25	70	44
9....	1 *H. bovis* taken	5	48	......	69	44
10....	Flies seen, cattle running	6	00	......	71	42
11....	“ “	......	36	.04	68	40
12....	Cattle quiet, no flies	2	30	.16	70	43
13....	“ “	Dull		.08	69	41
14....	“ “	Dull		.02	68	42
15....	“ “	Dull		.58	64	40
16....	Flies seen, cattle running	2	12	......	66	47
17....	“ “	5	18	......	70	46
18....	Cattle quiet, no flies	6	00	......	79	34
19....	“ “	11	06	......	88	42
20....	Flies seen, cattle running	11	54	......	95	56
21....	Cattle quiet, no flies	11	36	......	84	50
22....	Flies seen, cattle running	11	30	......	78	49
23....	Cattle quiet, no flies	11	10	......	81	46
24....	“ “	10	54	......	86	48
25....	1 *H. bovis* taken	10	06	......	76	49
26....	Cattle quiet, no flies	Dull		......	70	49
27....	“ “	......	36	.05	71	56
28....	“ “	......	30	.02	72	58
29....	Flies seen, cattle running	2	42	......	77	58
30....	“ “	5	30	.08	75	56
31....	Cattle quiet, no flies	5	00	......	72	55
Aug.						
1....	Cattle quiet, no flies	7	08	......	78	52
2....	“ “	6	08	......	76	50

No more flies seen for the rest of the season, nor were the cattle seen running.

SEASONAL ACTIVITY OF H. BOVIS AT AGASSIZ.

In 1912, *H. bovis* was first noticed on June 8th, and the last appearance was on Aug. 2nd, a total of 55 days.

In 1914, *H. bovis* appeared on May 31st, and none were recorded after July 27th. On this latter date, the flies were seen attacking the cattle at 6.30 p.m. Total 57 days.

In 1915, the flies were either seen or caught on 28 days, from June 5th to July 30th, a total of 55 days. The height of the season was from June 20th to July 11th.

These observations coincide closely with the pupal period and with the time the last larvæ emerge from the backs of cattle; both at Agassiz and in Europe.

EMERGENCE OF LARVÆ.

Carpenter (1915) says that most of the maggots emerged from May 27th to June 17th, “while a belated one occurred several weeks afterwards on July 3rd.”

In my own article (1912) I recorded the last larvæ of the season on July 2nd.

Lucet (1914) says, “Sur 79 que j'ai recueillies, 24 l'ont été du 16 au 31 mai; 53 du 1er au 30 juin; 2 au début de juillet, époque a laquelle mes sujets d'experience en furent débarrassés.”

PUPAL PERIOD FOR H. BOVIS.

Miss Ormerod (1900) puts the pupal period at 25-36 days = 32.5 days.

Carpenter (1908) at 31-32 days. (1914, about 8 weeks. Not included in average).

Hadwen (1912) at 34.7 days.

Glaser (1913) gives an average of 44 days.

Lucet (1914) records an average of 32.5 days.

Averaging all these records gives a result of 35 days.

If then, the last larvæ emerge about the first of July, the season for flies cannot extend far into August, and my records show this to be the case.

THE EFFECT OF TEMPERATURE ON THE PUPAL PERIOD.

I have already shown (1914) that if the pupæ of *H. lineatum* are placed in an incubator that the fly will emerge in as short a period as 13 days. This year I placed several larvæ of *H. bovis* in an incubator kept at 80°F. The pupal period was shortened to 17.4 days.

PUPÆ KEPT IN INCUBATOR AT 80°F.

						Period.
2 larvae	pupated	May 1st......	Emerged	1* 1†	May 19th........	19 days.
3	“ “	3rd	“	3	“ 20th........	17 “
1	“ “	4th	“	1	“ 20th........	16 “
1	“ “	5th	“	1	“ 21st........	16 “
2	“ “	6th	“	1	“ 22nd........	18

As the temperature at which the pupa is kept causes early or late emergence, the situation in which the larva finds itself on leaving its host will make some difference also. An experiment I hope to carry out next spring is to place some pupæ in a situation such as the edge of a manure-pile; here the larvæ would derive heat much in the same way as if placed in an incubator. Others must find crevices in the floors of stables, etc., where they would be warmer than out of doors. These warm situations would mainly favor *H. lineatum* and the early larvæ of *H. bovis.* Later in the season, when the sun is stronger in June and July, I do not think the places the larvæ choose to pupate in can matter so much. But early in the year it is quite possible that some of the early appearances of *H. lineatum* may be accounted for in this way.

AN EXPERIMENT MADE TO PROVE HOW *H. BOVIS* ENGENDERS FEAR IN CATTLE.

July 1st, 3 p.m. Two calves which had been kept inside since they were born, were turned out into a small paddock. The cattle which had previously occupied the paddock, had just been put into the stable, and the flies had been chasing them a few minutes before. The two calves on being liberated at once began to caper about and run as calves will after they have been confined. Finally they came to a halt just in front of me. They stood there panting. A moment or two later I saw a single *H. bovis* attack one of the calves. It struck several times before it was noticed. Finally I saw the calf give a kick or two, then it turned its head round to see what was annoying it. There were some more kicks and stamps, then the calf began to move away, its tail went up and it began to run and finally to gallop. The other calf remained standing for a short time after the first one left, but soon went through the same antics as the first. Both calves ran erratically about the paddock; they finally discovered a barrel used for watering the cattle; they both tried to get into it at once, and I was fortunate in securing a photograph of them in this position.

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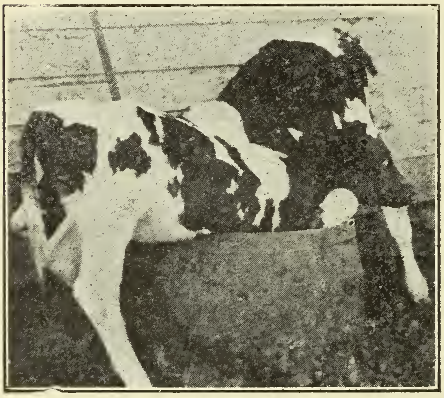
* Male. † Female.

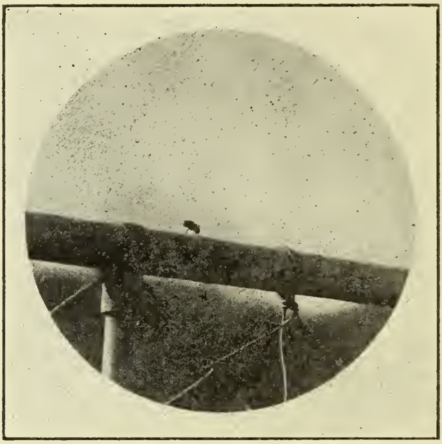
The flies (there were, I should judge, three or four in the field) kept on striking even when they were in the barrel. Later the calves found a corner behind some boards, there they lay perfectly quiet with their noses stretched out straight in front of them on the ground. Occasionally a fly would find them, they could stand the fly striking perhaps half a dozen times, but then, suddenly, they would get up and run as if possessed.

I have noticed the cows endeavoring to hide from the flies just in the same way. If they could find the least bit of shade along a fence or building, they would lie there quite motionless, until roused by the repeated attacks of the fly. In some cases cattle lie down also from exhaustion.

This experiment was also witnessed by Mr. Moore.



Calves attacked by *Hypoderma bovis* trying to get into a barrel of water.



Hypoderma bovis sitting on fence, waiting to attack cattle.

In my first paper of 1912, I gave my reasons for cattle being afraid of *H. bovis.* I quote the following: "It is this clumsy, persistent attack which I believe frightens cattle, and I would suggest that probably it is this cause which makes cattle stampede or 'gad.' When the *Tabanidæ* (or other flies) attack an animal and cause annoyance, the cow simply flicks her tail or brushes off the fly with her tongue, and feels that she has control or can get away from the insect. But a Warble fly comes buzzing along, strikes a time or two, and when the animal it is attacking kicks or stamps, it comes back just the same. Then the animal begins to lose its head and runs away, and when it still finds itself followed becomes wild with terror."

There have been so many false theories advanced for the fear which these flies engender, that I feel licensed to go fully into this question.

The commonest theory is that cattle are afraid of the fly because of its resemblance to a bee. The experiment just quoted refutes this entirely, because the calves had never seen a bee. Another idea is that cattle fear the fly because they are aware that it will cause them future trouble. This idea must have come from someone who thought that cattle were endowed with especial intelligence.

The only theory which all entomologists now agree upon is that the old idea of the fly causing pain is wrong, seeing that it has no organs capable of piercing the skin. Some authors claim that other insects as well as Warble flies cause cattle to "gad."

This is also entirely wrong, and can be refuted in several ways. For instance, I saw *Tabanidæ* and other flies worrying the cattle this year long after the last Warble fly had left, and did not see any of them stampeding. Besides as I have pointed out cattle only run one or two at a time from other insects. They merely show anger and not fear, when they run into the bushes or dust themselves. With *H. bovis* the fear is undoubtedly contagious. The only time I think it is permissible to make a mistake, is when cattle are at play, when they often run with their tails up. Or when, for instance, a steer has been roughly handled and dashes wildly into the middle of a herd of cattle, then one sometimes sees a stampede. In other words if a cow gets really frightened from any cause and runs, then those near her will often follow, and the fear spreads. This is exactly what takes place when an animal is chased by *H. bovis.*

The great difference between *H. bovis* and *H. lineatum* is in their effect upon cattle and in their methods of oviposition. I have shown that *H. lineatum* may not even be felt when it lays its eggs while resting on an animal's foot or on the ground. When it does grasp the hairs to lay eggs for instance on the hock, it does so gently, otherwise it would be brushed off before it had time to lay several eggs on the same hair.

H. bovis is rougher and clumsier in its attack and as it only lays one egg at a time, it can do so regardless of the fact that the animal may be kicking or running.

THE PENETRATION OF THE SKIN, AND THE LESIONS PRODUCED BY THE LARVA OF *Hypoderma bovis.*

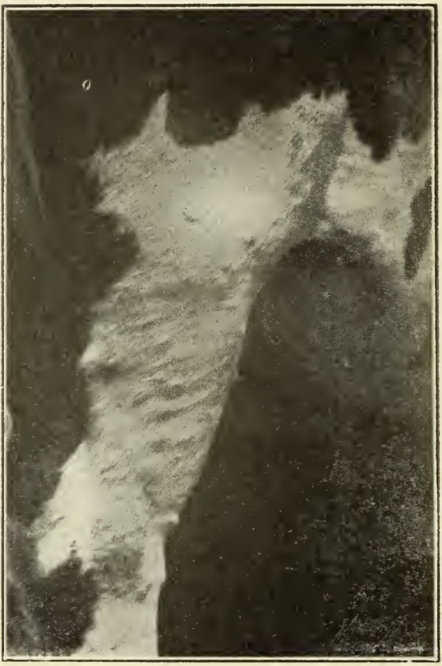
Hewitt (1914) saw three larvæ of *H. bovis* work their way into the skin of a calf. I have not been fortunate in seeing the penetration of the skin by these larvæ, but can confirm Hewitt's observation in another way, by showing lesions on the skin of cattle, over which were found the eggs of *H. bovis.*

I have already described the skin lesions produced by the larvæ of *H. lineatum,* and of the disease caused by them, for which the name of *hypodermal rash* was proposed. The penetration of the larvæ was proved in three different ways—by removing bits of skin from cattle and placing larvæ upon them, by finding a larva in the act of passing into the skin of a cow, and finally by expressing two larvæ from the skin of an animal which I had under observation. The passage of the larva in *H. bovis* was proved by cutting circles in the hair round new laid eggs, and later, after the eggs had hatched finding the swellings underneath.

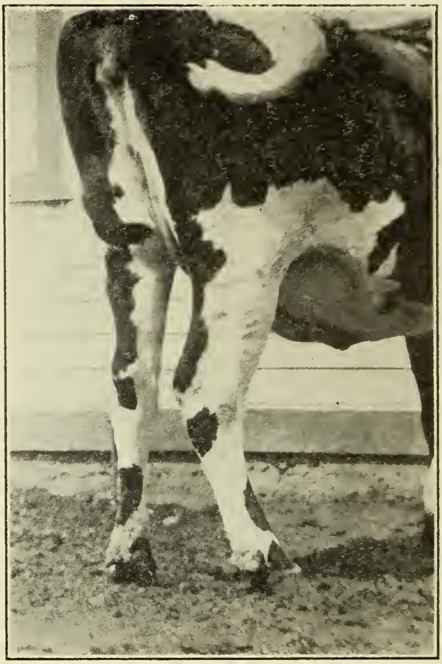
The swellings are somewhat different from those caused by *H. lineatum,* There is not so much exudation of serum, and they seem rounder and more raised. They are usually about half an inch across, but if several eggs are laid close together the swellings may merge. The explanation of the difference in the character of these lesions, is because in *H. bovis* the eggs are laid singly. In *H. lineatum* it is most likely that several larvæ choose the same follicle for entrance, seeing that a number of eggs are attached to the same hair. In my experiments I also noted that the eggs nearest the skin hatched first, due no doubt to the animal heat and to their having been laid first, and it would appear probable that the larvæ follow one another through the same opening. The result would be a larger opening than the single larva of *H. bovis* could make, consequently a bigger flow of serum. The swellings in the case of *H. bovis* are sometimes quite large, but there is not so much dermatitis or exfoliation of the skin.

It is clear that the amount of damage done would depend on the variety of bacteria introduced beneath the skin, and to the resistance of the animal against the particular organism.

One remarkable fact I have noted which applies to both species of larvæ, is that the swellings and skin lesions are confined almost entirely to the older animals, the calves only show slight effects. This peculiarity can be observed in several microbial diseases. It is a sort of natural immunity which breaks down as they grow older, and is all the more interesting because young cattle are more parasitized than the old by Warble flies.



Lesions on outside of cow's leg.



Lesions on hindquarters; note large swelling on left leg behind the udder.

No appreciable lesions have been noticed below the knee or hock. The skin while it is very thick on the legs, is quite porous and open; perhaps owing to its tightness and thickness the swellings are not so evident. *H. bovis* does not lay as many eggs round the hoof as *H. lineatum*. This is an important difference, for it is probable that many of the lamenesses resulting from swollen feet are due to the larval penetration. For three years in succession, lamenesses among the cattle have occurred here during the season for *H. lineatum.*

Situations in Which Eggs are Laid.

There is little to add to my previous descriptions, except to emphasize the irregular distribution of eggs as compared to *H. lineatum*. The photographs show the scattered lesions. The irregularity must be due to the fact that cattle are running when the fly is laying, so that the eggs are deposited at random. On a number of occasions *H. bovis* was seen flying beside the animals just about level with the stifle joint, striking repeatedly at the outside of the leg. This is, I find, the most common manner of ovipositing during rapid flight. Another favorite way is to follow a foot or two behind, then catching up and striking just below the pin bones. But the first few strikes prior to the animals getting away are almost invariably on the legs, lower down.

SUMMARY.

The seasonal activity of *H. bovis* at Agassiz is from the beginning of June to the beginning of August.

The last larvæ to emerge from the backs of cattle, leave during the first days of July.

In *H. bovis* the pupal period averages thirty-five days.

High temperatures shorten the pupal period.

The fear cattle have for *H. bovis* is due to the insect's persistence and manner of egg-laying.

Hewitt's observations on the penetration of the skin by the larvæ of *H. bovis* are confirmed.

The lesions caused by the larvæ, differ from those of *H. lineatum.* Older animals show more lesions than the young.

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Note.—I am indebted to Dr. F. Torrance, Veterinary Director-General, for permission to publish this article.

THE PRESIDENT: Mr. Treherne is to be congratulated on the excellent manner in which he has presented another man's piece of work. It is very difficult to present in so intimate a manner the work which another man has been responsible for, but it shows how closely Mr. Treherne has watched and been interested in the work of Dr. Hadwen. I think it is one of the most important papers that has been discussed at this meeting. The question of the method of entrance of *Hypoderma bovis* has been a disputed point for many years and we have had observations and evidence supporting now one view and now another, but in view of Dr. Hadwen's conclusive experiments, which have been supported by photographs, I think he has cleared up this question. We are pleased to have with us this morning Dr. T. Torrance, the Veterinary Director General of the Health of Animals Branch, Department of Agriculture, and perhaps he would have something to say in connection with these two papers.

Dr. Torrance: Mr. President, ladies and gentlemen, it affords me very great pleasure to be with you to-day, especially as one of our men has contributed something towards the programme. The work which Dr. Hadwen has done is very much appreciated by his chief, and I think, will be appreciated by all when it is better known. He has proved a very diligent and careful investigator, and I think the facts which he has brought out will bear the closest scrutiny. He has succeeded in throwing light upon a very difficult problem, the problem of the migration of newly hatched warble larvæ to their final resting place beneath the skin of the back. The importance of this work will be realized when I tell you that in Canada the leather produced is damaged to the extent of perhaps 70 per cent. by the presence of this larva. After the larva has escaped from the back the scar tissue which repairs the damage causes that portion of the leather to be unsuitable for the manufacture of the better grades of harness. You are, perhaps, aware that in making harness, especially traces, it is necessary to take long strips of the thickest leather from along the back. This is the part that is chiefly damaged by the warble flies, so that the best portion of these hides is unsuitable for the manufacture of harness. In correspondence with practically all the tanners of Canada referring to the damage done by this parasite, the opinion was expressed that it was the greatest source of injury to the leather that they knew of. There were not many other things that caused the same amount of damage. The injury caused by barbed wire fences, warts, etc., was trivial when compared with the damage caused by this warble fly. It is only by the close study of the life-habits of a parasite that we can arrive at the best possible means of combating it and we hope that the result of this work of Dr. Hadwen's will be some practical method whereby the damage caused by this insect can be avoided. I was greatly interested, too, in the paper read by Professor Lochhead, in the damage he describes in horses, as we have had practical experience with the effects of these parasites on horses. The more common is the one to which he did not refer, the *Gastrophilus equi*, an extremely common parasite of horses. In my experience covering thirty years of active practice I may say that I have seldom found a horse not infested. Every horse that passes a portion of its life in the open is sure to contain these parasites. In cities horses may possibly avoid them but it is very common to find them in a horse's stomach. Among farmers the presence of bot larvæ in a horse's stomach is looked upon as the cause of the horse's death in very many cases, but when we find them in horses that have died from any cause we may realize that the presence of a moderate number of these parasites may be tolerated without injury to the animal's health. On the other hand, we know that where they are present in very large numbers they affect the function of the stomach to such an extent that many derangements may take place, such as ulceration of the walls of the organ. These larvæ are harmless when in small numbers but in large numbers cause much trouble and sometimes death. The Nose Bot Fly, which give so much trouble to the farmer in the North-west when he is hitching up his horses, does not cause so much trouble; it is not nearly so harmful to the horses and we have very few examples of its doing much injury, the annoyance it gives is about all the harm it does. Why the ovipositing of these two flies, the Bot Fly of the horse and the Bot Fly of the cow, should occasion such intense fear in the victim I do not know. We are assured by scientists that neither of these flies have any stinging apparatus and yet the animal affected shows every evidence that the fly must inflict much pain. I cannot imagine that the depositing of the eggs upon a hair would give so much discomfort to the animal. I think we will have to search a little further, probably, and gain more experience before we learn the actual cause of the terror in cattle and horses caused by the Bot and Nose Flies. The contributions that have been made on this subject to-day are of great importance and I wish to express the feeling of pleasure that I have in meeting you all to-day and to assure you that my Branch will assist Dr. Hadwen in carrying on the work he is now engaged in.

THE PRESIDENT: The Society is very much indebted to Dr. Torrance for his valuable contribution and for the information which he has given from the veterinary side.

DR. TORRANCE: Mr. President, I have brought up with me some specimens and pictures which Dr. Hadwen sent me.

THE PRESIDENT: The question of the effects of internal parasites which Dr. Torrance brought up is one which has been always of great interest to me, and it becoming more generally realized that the importance of these parasites is not so much because they are present but owing to the fact that their presence may be responsible for the penetration of the mucous membrane of the alimentary tract. Now these two papers have a number of important points and I have no doubt there are other members who would wish to discuss them.

MR. TOTHILL: Mr. Chairman, this paper to me is one of the most interesting that has been presented for some years on account of its extremely interesting biological points and on account of its significance. It may be interesting to recall that the origin of the Oestridæ is quite uncertain, but at the same time they are undoubtedly related to the parasitic dipterous families Tachinidæ and Dexiidæ. In my studies on life-histories of the Tachinidæ some years ago it became evident that there was something the matter with the supposed life-history of the Bot Fly. In the Tachinidæ there are flies which deposit eggs which are taken into the alimentary canal. The larvæ migrate from the alimentary canal to various tissues of the host. In every known case in which this habit obtains the egg is modified for passing down the alimentary canal without injury. In the eggs of these warble flies it is evident that there is no such modification for such a habit and this work of Dr. Hadwen's clearly shows that the larvæ do not pass through the alimentary canal, is very interesting.

MR. SANDERS: In regard to the date of introduction of *Hypoderma bovis* into Canada, we have a pretty fair idea as to when it first became common in Nova Scotia owing to the fact that oxen are worked so much more down there than in the rest of Canada. Farmers will tell you that the Gad Fly became a nuisance in Nova Scotia about fifteen years ago. It causes a little damage that has not been mentioned in these papers, that is, the damage that the oxen do when they are attacked by these insects. It drives the oxen almost frantic; appearing about the 10th July and attacking the oxen all through haying time. Sometimes they will be driven so wild as to run away with the loaded hay waggons, and often will break wheels, axles, tongues or yokes in their efforts to get away from the insects. We find that cattle are mostly attacked in the open, and when a Gad Fly appears in a herd of cattle they will at once take to the bush where they seem to be free from attack. From Dr. Hadwen's work, can Mr. Treherne suggest any method of control?

MR. TREHERNE: I don't think it would be letting Dr. Hadwen's secrets out if I told you that he is pretty well satisfied he can effectively control these flies. Now that the penetration takes place through the skin, he thinks he can dip every ten days or so and give the larvæ a dose of arsenic.

Dr. Torrance: Might I be allowed to say another word in connection with the last fact brought out by Mr. Treherne. There is a portion of the North-west territories in which the disease known as Mange of cattle has been in existence for some time. This is known as the "Mange Quarantine Area," in which we require the dipping of all cattle. It has been found that in this area it has also had the effect of lessening the ravages of the warbles. The skins of the cattle in this district are more free from warbles than they are anywhere else.

Dr. Fernald: It certainly seems that the two papers here this morning have contributed much of interest to this subject. I am very glad, indeed, that I can now change a statement made to my junior students that the eggs of the warble fly are licked off into the mouth, and give something that is more accurate. I have thought for many years that there was room for more work on this subject, but certainly in the regions where I am now living these flies are not abundant enough to cause much attention and the opportunities for their study have been few. In connection with Professor Lochhead's paper, the attitude some of his correspondents have taken has been paralleled by an experience of my own. A case was recorded this fall of a house having been so infested by fleas that it was impossible to live in it. The members of the family were very anxious to know what could be done. I naturally, under the circumstances, gave out the remedy for fleas. When the specimens came in accompanied by the statement that it was unbearable to live in the house on account of the bites of these fleas, the specimens were those of the Pomace Fly.

Mr. Payne: I understand, Mr. Treherne, that Dr. Hadwen has found in the migration of the second stage larvæ that they pass down the spinal cord, is there anything in that?

Mr. Treherne: As far as I understand, Mr. Payne, the eggs, if laid on the knee, for instance, hatch and the larva passes up by the fibrous tissue route until it reaches the stomach, and after stopping there for some time it proceeds in a direct line to the back of the animal, emerging, however, horizontally in the last stage.

Mr. Petch: *Hypoderma bovis* in the counties of Huntingdon and Chateauguay has proven to be a very injurious insect, and as these two counties are practically a dairying district, I would like to know if Dr. Hadwen has found any appreciable effect on the milk supply.

Mr. Treherne: The irritation produced by larvæ within the bodies of cattle does not seem to affect the milk supply to any great degree, but the presence of the fly in the pasture field and its terrifying effect, may easily be understood to affect milk yields.

The President: The only damage caused, Mr. Petch, seems to be that the cattle are bothered while feeding.

Prof. Lochhead: There is a suggestion in connection with one of the letters which I received and which, I think, this Society could take up, that is, the removal of the warbles before spring from the backs of the cattle. If all the farmers co-operated and removed the warbles before the first of April I think it would soon control this warble fly and, at any rate, it would be worth while trying. I would like to hear what the Society thinks of such a move.

The President: As Professor Lochhead no doubt knows, that system has been followed in Europe, especially Germany and Denmark. It is customary to appoint a man to go around extracting the warbles, making a small charge per head and it certainly accomplishes much good, and I recommended in my annual report a few years ago the importance of such co-operation. This could be helped along very much by the use of the press.

If there is no more discussion on these two papers we will pass on to the next paper on "Forest Insect Investigations in Canada." I regret to say that Mr. Swaine, who was to have read this paper, has been suffering very severely from grippe during the past week or so, and while he hopes to be at the meeting this afternoon he did not feel sufficiently well to give his address this morning, so we will postpone the paper until this afternoon. Therefore, I will take this opportunity of making a few brief remarks in regard to the progress of our work.

PROGRESS OF ENTOMOLOGY IN CANADA DURING 1915.

C. Gordon Hewitt, Dominion Entomologist, Ottawa.

As I remarked in opening our meetings yesterday I do not consider that it is necessary or even desirable for the President to give a presidential address on re-election, apart from the fact that we have a very full programme. Nevertheless, it may be of interest to review the progress of our work in Canada during the past year, especially as we have a number of visitors from other countries. As you may remember, the Minister of Agriculture arranged for a campaign to be carried out shortly after the outbreak of war for the purpose of securing greater production and in this work the Provincial Governments co-operated fully. That this campaign has proved successful is shown by the fact that the other day the Minister of Finance, in Montreal, said that on a conservative estimate our agricultural products would exceed those of last year by three hundred million dollars; such a result at the present time when the question of food supply is a vital one is very encouraging. As entomologists we have played our part in this successful effort to increase our production. Everyone realizes that increased agricultural production is dependent very frequently on the control of insect pests. One of the most important steps to be taken in order to secure production is to reduce or eliminate those factors which check or reduce production; of these factors insect pests are one of the most important. For this reason we have all endeavoured to exert ourselves harder than ever during the past year with a view to persuading the farmers and fruit growers to take steps in an increasing measure to control those factors which are responsible for loss of production.

I feel sure that those of our officers who have been working at the Branch Laboratories in the various provinces will feel that their work has been very successful in this direction. In Nova Scotia, the energetic work that has been carried on so successfully by Mr. Sanders has done more than anything else, so I am informed by the fruit growers of that province, to increase spraying and spraying along successful lines in the Annapolis Valley. This means more fruit and fruit of a better grade.

Mr. Petch has been carrying out similar educational work in Hemmingford County in Quebec, with good results, and has shown the value of insect control in the production of more fruit and fruit of a higher grade.

Our work on Locust Control in the Province of Quebec will be described by Mr. Gibson this afternoon. The depredations of locusts in certain parts of the Province of Quebec have been serious and extreme during the last few years. In some sections farmers had to abandon their farms on account of the repeated total destruction of their crops by locusts, and the number of abandoned farms in some parishes caused serious apprehension. We have been carrying on experiments in the control of locusts by means of poisoned baits and decided to carry on the work on a larger scale during the past season. In certain parishes we were fortunate in having the co-operation of the parish priests, who were of great assistance in bringing about co-operative effort on the part of the farmers. We have been able to demonstrate to those farmers the value of poisoned baits and the change that has been wrought is most satisfactory. Serious losses year after year had disheartened these farmers to the extent in many cases of compelling them to abandon their farms as I have remarked. Now they have found the means of controlling the locusts at a comparatively low cost and of saving their crops, and the saving in the aggregate has been very great during the past season. The farmers have not only returned to their farms, but those who had remained, although disheartened, now see a brighter prospect and will improve their farms on account of the possibility of removing the cause of the depression.

Mr. Strickland described to us yesterday his work on the control of Cutworms in Alberta, and I do not think that this subject requires further discussion on my part. He described very clearly how by his investigations and demonstrations to the farmers he was able to prevent serious losses which otherwise would have occurred in Southern Alberta.

I have only mentioned a few cases. In such manner our work has been of direct assistance in the movement for increased production. Similar work has been carried out at all our field laboratories and from headquarters, and each of the Provincial Departments of Agriculture who maintain an entomological staff has been increasing the activity in their efforts.

This increased assistance has created a greater demand for such assistance and we are now finding that as the farmers and fruit-growers realize that this work has been done for their direct benefit there is an increased call for assistance. It is the creation of that demand which will enable us to carry out to a greater degree the objects we are striving to obtain, namely: to bring ourselves in touch with a larger number of people whom we are able to assist by the information we are securing. All must feel that we are making the best use of our abilities in this time of great crisis.

During the past year we have discovered several new pests in Canada. Probably the most important of these is the Pear Thrips, *Tæniothrips pyri,* which Mr. Treherne reported from the Victoria district on Vancouver Island. British Columbia. The serious nature of this pest will be realized from the fact that in California it is estimated to cause an annual loss of about ten million dollars on prunes alone. At present it appears to be confined to a very small territory near Victoria, but we fear its spread to other sections. Mr. Treherne also reported the occurrence of the Currant Bud Moth, *Eriophyes ribis,* at Duncans on Vancouver Island in British Columbia. This pest has evidently been imported from Great Britain, where it is one of the worst pests of black currants occurring there, as I know from personal experience. Every step will be taken to prevent the spread of these two new and serious fruit pests.

We referred, in our session yesterday morning, to the increased organization of entomology which had taken place in Canada and I spoke of the formation of the Entomological Society of Nova Scotia, for the organization of which great credit is due to Professor Brittain. Before the outbreak of war the Council of your Society had under consideration the improvement of the organization of

Entomological Societies throughout Canada. We hoped to develop other branches and bring together a large number of people interested in entomology who are at present unattached to any society and in turn to bring them into touch with the active workers; but as this question involves financial consideration it must necessarily be postponed. Nevertheless, the Society has every reason to be proud of the manner in which entomology is now organized throughout the Dominion and the increased attention that is being paid to this study. Throughout the country we are finding more and more people who are becoming interested in the subject and in time we will endeavor to create a sentiment which will be productive of pleasure to themselves and of value to us in our practical work.

You will be pleased to learn that increased facilities have been provided for the work of the Entomological Branch during the past year and I think it will be of interest to all the members of the Society if I describe the new laboratories that have been erected during the past year.

The pressing need for increased accommodation for the entomological work that is being carried on in various provinces by the Field Officers of the Entomological Branch, and a demand on the part of farmers and fruit-growers for further assistance in controlling insect pests, have been responsible for a decision on the part of the Minister of Agriculture, to have entomological laboratories erected where they were most necessary. Accordingly four new laboratories have been built during the past summer at the following places: Annapolis Royal, N.S.; Fredericton, N.B.; Treesbank, Man.; and Lethbridge, Alta. These laboratories I will briefly describe.

ENTOMOLOGICAL LABORATORY, ANNAPOLIS ROYAL, N.S.

Since 1912 a small laboratory at Bridgetown, N.S., served as headquarters for the entomological work of the Branch in Nova Scotia. The increase of the work and of the staff employed necessitated increased accommodation. Annapolis Royal was selected as the place for the new laboratory on account of its situation in reference to the area of the Brown-tail Moth infestation, convenient railroad facilities and the presence of a promising fruit-growing district in which the orchards were not at present properly cared for. The laboratory is erected on an excellent site on the County School Grounds which the School Board of Annapolis Royal have kindly provided.

The building measures twenty-six feet square and consists of basement, ground floor and attic. In the roomy basement accommodation is provided for field and spraying equipment; it also contains a dark-room and laboratory. The ground floor is divided into three rooms, namely, an office for the Field Officer in charge, a large laboratory and a general work room. The commodious attic is specially well-lighted to serve as a photographic room and work room. Steam heating is installed.

From this laboratory the campaign in Nova Scotia against the Brown-tail Moth is directed. In addition, investigations are being carried out by Mr. G. E. Sanders, Field Officer in charge, on the more important insects affecting fruit* such as the bud-moth and fruit-worms of apples. Experimental work in spraying and the investigation of insecticides has already rendered very valuable assistance to the fruit-growers of the province. The former entomological station at Bridgetown will be used as a sub-station whenever it may be most needed.

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*To prevent duplication of work and to secure the best co-operation, the Dominion Field Officer confines his attention to the biting insects and the Provincial Entomologist, Prof. Brittain, studies the sucking insects (aphides and bugs).

ENTOMOLOGICAL LABORATORY AT FREDERICTON, N.B.

In 1912, a small laboratory was established at Fredericton, N.B., in connection with the Brown-tail Moth and other work in New Brunswick. The University of New Brunswick provided a site on the University campus. The increase in the infested area, and the large amount of work consequent upon our efforts to establish the parasites of the Gipsy and Brown-tail Moths imported from the New England States and the carrying on of an extensive study of the natural control of certain native insects such as the Tent Caterpillars, the Spruce Bud-worm and Fall Web-worm, rendered an increase in the laboratory accommodation immediately necessary; the University had kindly permitted us to use one of their large laboratories during the summer.

The building is of solid brick construction and measures twenty-four feet by thirty feet. It consists of basement, ground floor, first floor and attic. The basement contains the water supply for the building, comprising a well, tank, and electrically driven pump, and provides storage room for field equipment and supplies. The ground floor contains at the front offices for the two officers in charge of the work; Mr. J. D. Tothill has charge of the colonization and study of the parasitic insects and Mr. L. S. McLaine has charge of the field work against the Brown-tail Moth and the collection of parasites in the New England States; at the back is a work room. On the first floor a large laboratory occupies the front half of the building and behind a specially lighted room is provided for photographic and other work; a dark room and bath room are also provided on this floor. The high pitched roof furnishes a roomy attic for storage purposes. Steam-heating and electric light have been installed. The building is well situated on the University campus on a site which the University authorities have generously provided.

The work that is carried on at this laboratory comprises some of the most important investigations that the Branch is prosecuting on the natural control of insect pests. The thoroughness with which the Brown-tail Moth campaign is carried on is evidenced by the fact that by taking the necessary measures from the time of the discovery of the first infestation, it has been possible in New Brunswick to prevent this insect from becoming established in the Province; whereas it is established in Nova Scotia owing to a lapse of some time before the infestation was discovered in 1907 and eradicative measures were begun.

The small laboratory will be used as a sub-station in another part of the Province.

ENTOMOLOGICAL LABORATORY AT TREESBANK, MAN.

Mr. Norman Criddle was appointed in 1913 to carry on investigations on White Grubs (*Lachnosterna*) and other cereal pests in Manitoba and adjoining territory. As the temporary quarters he occupied did not afford adequate accommodation for his work a small wooden laboratory measuring twelve feet by sixteen feet has been erected during the past summer on a site kindly provided by Mr. Percy Criddle on his farm where excellent facilities occur for field and experimental work.

ENTOMOLOGICAL LABORATORY AT LETHBRIDGE, ALTA.

Investigations on insect and other pests in Southern Alberta were commenced in 1913 by Mr. E. H. Strickland, Field Officer for Alberta, who was provided with temporary laboratory accommodation at the Dominion Experimental Farm at Lethbridge, Alta. During the past summer a permanent laboratory was built on the Experimental Farm.

The building measures twenty-three feet by twenty feet and contains four rooms, namely: office, laboratory, spare room and dark room. By arrangement the Director of the Experimental Farms and the Superintendent of the Farm have kindly furnished for experimental purposes a small plot of ground adjoining the laboratory.

I will not take up more of your time with any rambling remarks of mine; but before closing I should like again to express to our visitors our gratitude to them for coming so far to take part in our proceedings, their presence and contributions to the programme and the discussions are a source of great encouragement to us and I think they will admit that though our numbers are not large the character of the work that has been described is of the highest nature judged by any standard, and that our enthusiasm could not be excelled.

THE LIFE HISTORY OF *CHERMES COOLEYI* GILLETTE IN STANLEY PARK, VANCOUVER, B.C.

R. N. Chrystal, Field Officer for Forest Insects, Entomological Branch, Department of Agriculture, Ottawa.

As a result of an enquiry into the serious injury done to the Sitka Spruce in Stanley Park, Vancouver, B.C., by the attacks of the above species of gall-making insects of the Genus Chermes, the following notes of its life history and habits in that region are presented. This species was named and described by Professor Gillette, Fort Collins, Colorado, in his paper, "Chermes of Colorado Conifers," Proc. Acad. Nat. Sci. Philadelphia, Jan., 1907; its life cycle also being discussed. The following account in a large measure confirms the results given in the above paper, differing only in the species of spruce attacked, and some minor details.

The hibernating stem mother on the Spruce, is oval in outline, flat, .5 to .7 mm. in length, .3 mm. in width, dark brown to black in colour, with a slight fringe of white waxy threads along the edges of the body, and down the middle of the back. The body of the louse is closely appressed to the twig, and the setæ are deeply sunk in the crevices of the bark. The location on the twig varies, from immediately below the terminal bud to 3 inches down the stem.

During the first week of April, 1915, the stem mothers, having cast their winter coat, began oviposition on the spruce, the waxy secretion increasing to such an extent by this time, as to hide the dark coloured, and now much swollen body of the insect from view. Several hundred eggs may be laid by this Chermes, as many as 500 being counted in one egg mass; in cases where several stem mothers are located in close proximity to each other on the twig, the egg masses come together, and the waxy secretion becomes very conspicuous. The eggs are light brown in colour, lightly dusted with a whitish powder, each attached to the stem by a fine thread. They hatch in about 5 or 6 days, and the young, which are light reddish in colour, locate themselves at the inner bases of the young needles, then just breaking from the bud scales. A gall begins to form, and develops with great rapidity, the complete formation taking only a few days in some cases.

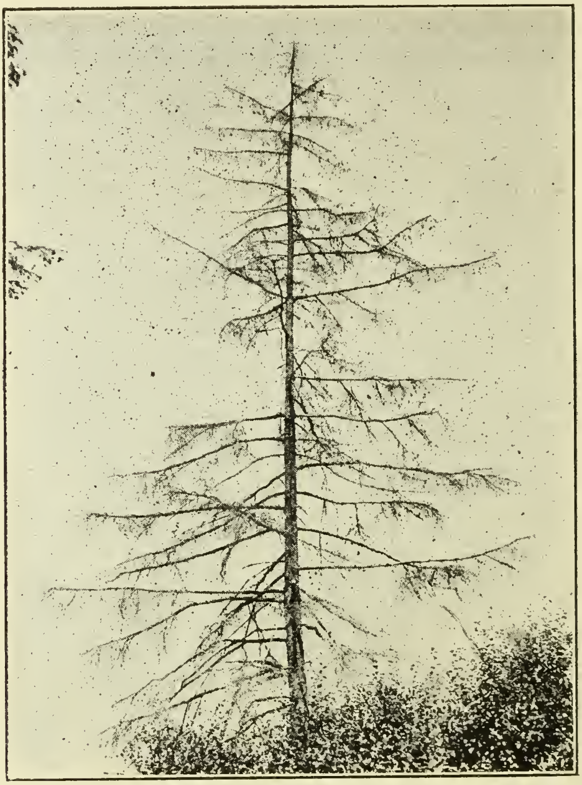
THE GALLS: The galls vary in length from ½ inch to 3 inches, the size apparently depending on the strength of the twig attacked. The following conditions may prevail:

(*a*) The whole twig may be completely galled.

(*b*) The twig may be galled on one side only, causing twisting and bending of the stem.

(*c*) Rarely, the upper part of the twig may be galled all round, and the lower part only half way round.

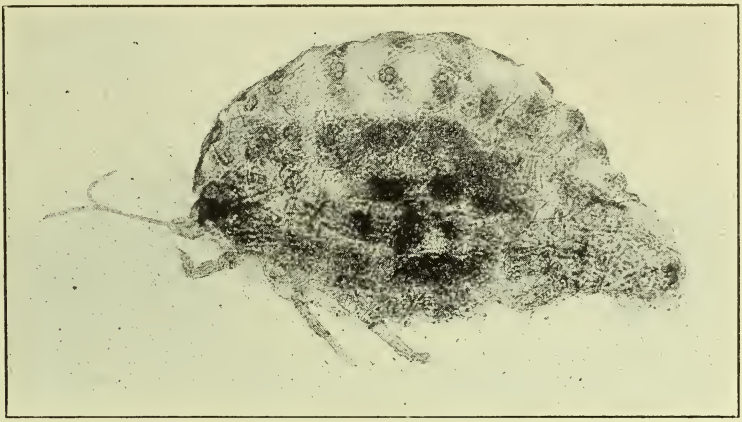
In Stanley Park the first condition was by far the most common, but it may be said, that even in cases where the twig was not completely galled, its ultimate destruction through weakness was, in nearly every case, assured. The number of chambers varies from 40 to 200, the number of young in each chamber varying from 1 to 15, with an average of 5. The young are seen to be covered with a waxy coat, which, as Professor Gillette indicates, provides them with a very efficient protection against the superabundance of liquid excretion which they exude. If galls, which are nearly mature, be opened, cast skins of the young may be found filled with this liquid. These very remarkable objects are also mentioned by Professor Gillette in this connection. A few days before the galls begin to open the young inside change to pupæ, the rudiments of wings being readily seen. The earliest date recorded for the opening of the galls in Stanley Park during the summer of 1915, was June 25th. This is the earliest record for this locality so



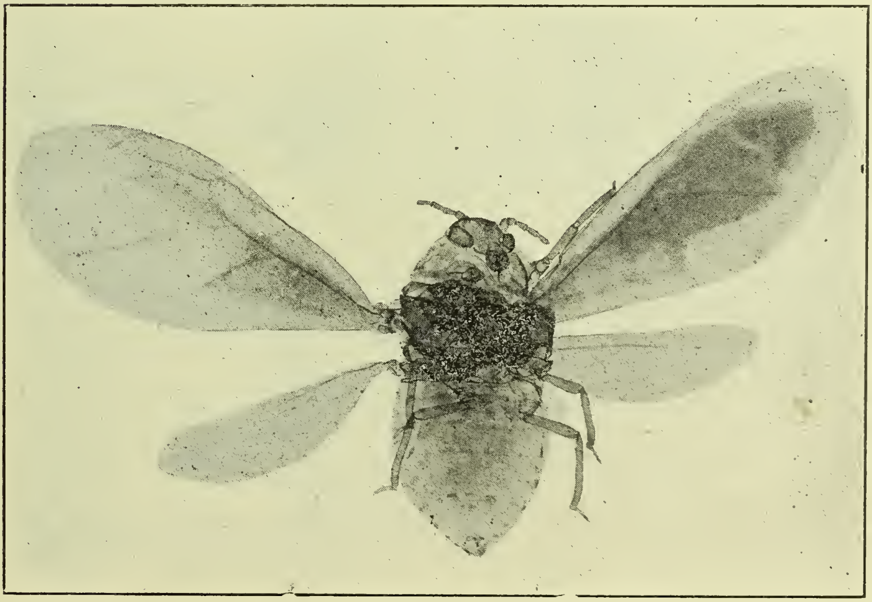
A Sitka spruce killed by chermes galls.

far, and doubtless a direct result of the unusual earliness of the past season, the previous year's (1914) date being about two weeks later.

When about to moult for the last time the pupæ crawl out of the gall chambers, and settle on a needle, the head facing the point of the needle. The pupa is reddish in colour with an outer coat of wax. This outer covering begins to split from the head down the middle of the back, the complete operation of moulting lasting some ten minutes. When the moult is completed the cast skin, a ghostly replica of its former occupant, is left hanging to the needle.



Details of wax glands, var. *coweni.*



Winged migrant to Douglas fir.

The newly emerged winged form has the antennæ and legs very light yellow, almost transparent; the eyes dark red and very conspicuous, the head, prothorax and abdomen rufous red, the mesothorax yellowish, streaked with red. The wings are crumpled up at first and dark green in colour, with the exception of the costal nerve, which is yellow. The green colour remains for some time after the wings are finally resting roofwise over the back of the insect.

The waxy excretion does not make its appearance in any quantity until some twenty-four hours after the winged form has emerged from its pupal covering.

MIGRATION. Experiments were carried out in Stanley Park two years ago with the object of confirming the former observations on the secondary host tree. Opening galls were placed in cages along with fresh branches of Sitka Spruce (*P. sitchensis*), Douglas Fir (*Pseudotsuga mucronata*) and Western Hemlock (*Tsuga heterophylla*), these three trees being the only conifers within the precincts of the Park. The experiments showed beyond all doubt that the secondary host tree was the Douglas Fir; only a few lice locating on the spruce and hemlock, on which they apparently do not thrive; whereas they were found settling freely on the needles of the fir, as many as 7 being found on the same needle, 2 or 3 being a common number. A few figures of the cage experiments are given below:

Stem mother on Sitka spruce.

Experimental cage in Stanley Park.

	Nos. of Lice Settling on Each Tree.		
Cage.	Spruce.	Douglas Fir.	Hemlock.
1	0	221	0
2	1	672	5
3	15	216	0
4	0	275	2

No success attended the attempts to breed the specimens through on spruce and hemlock at this time. In the open, winged migrants were found locating on the Douglas fir, confirming the experimental results, but in no case was any winged migrant found on a spruce or hemlock in the open. Within a very short time of settling on the needle of the Douglas fir the winged migrant commences to oviposit, about 100-150 eggs being laid. These hatch in 6 to 7 days, and the young, which are elongate oval in shape, and almost black in colour, with only a trace of wax present, settle on the needles of the Douglas fir. There they remain motionless, without any apparent increase in size, through the rest of the summer, fall and winter of the year, until the following spring; when having moulted once, they commence oviposition as stem mothers on the needles of the Douglas fir, laying from 30 to 40 eggs, which hatch in numbers about the end of May and the beginning of June.

This life cycle was traced out for Stanley Park by observations on marked twigs of Douglas fir, through the summer, fall and winter of 1914-15. During the first half of May, 1915, this generation on the Douglas fir was observed to be dimorphic, about 50 per cent. of the lice developing wings and migrating back on to the Sitka spruce, while the rest remained like the parent on the fir.

Stem mother on the Douglas fir.

The migration back to the Sitka spruce began about June 6. Experiments were started in this case as well as in the case of the former migration to the fir, to endeavour to determine for certain that the Sitka spruce was the return host. Young trees, of the three coniferous species, spruce, Douglas fir, and hemlock, were used, being enclosed in a cheesecloth cage. The fir was heavily infested with the Chermes and gave promise of good results. The numbers of migrants located was disappointing, but gave clear indications that the Sitka spruce was the chosen tree, the migrants found settling on the Sitka spruce in the cages were compared with winged migrants found settling on the spruce in the open and proved identical.

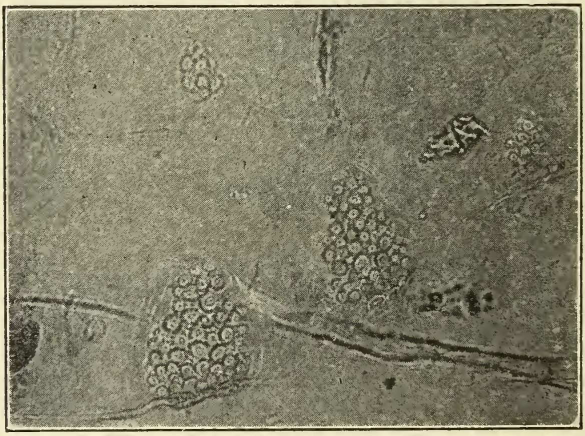
This form on the fir is Professor Gillette's *Chermes cooleyi* var. *coweni*. The apterous forms left behind on the needles of the fir, increase in size, and amount of wax secreted; lay a small number (30-40) of eggs, and the young on hatching take up their location on the needles of the spruce, there to remain until the following spring when they become stem mothers. The winged migrant to the spruce lays 30-40 eggs, and then dies, the eggs hatch in about a week and the young, which were kept under observation until the winter, remain on the needles, and probably, although this fact has not yet been actually followed in the case of Stanley Park, remain stationary until the following spring, when they become stem mothers for the new broods on the Sitka spruce.

Full descriptions of the various forms of this species and its variety *coweni* have already been published by Professor Gillette in the paper already cited; the writer would like to take this opportunity of acknowledging the assistance rendered by Professor Gillette in the identification of the material submitted to him.

A careful study has been made of the various forms, using Professor Gillette's published descriptions, and these have agreed in every case.

Mention may be made here of the principal differences between the various corresponding stages of the two forms on the fir and the spruce.

Chermes cooleyi Gillette.	*Chermes cooleyi* var. *coweni* Gillette.
Winged Migrant to Douglas Fir.	*Winged Migrant to Sitka Spruce.*
Antennal joints slender.	Antennal joints robust.
Antennal sensoria larger.	Antennal sensoria smaller.
Pores of wax glands small.	Pores of wax glands large.
Stem Mother on Spruce.	*Stem Mother on Douglas Fir.*
Wax glands large, with small pores.	Wax glands small, with large pores.
Beak long and slender.	Beak short and stout.



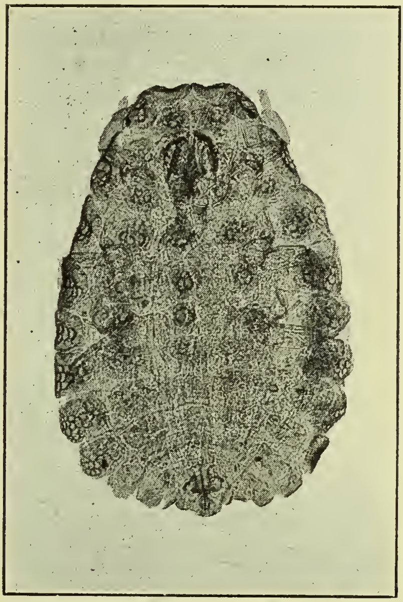
Winged migrant to spruce; details of wax glands.

Damage to the Spruce. The damage done to the Sitka spruce in Stanley Park by this form has been very considerable, a large number of trees have been killed, whilst many others are in a dying condition and beyond hope of recovery. The fact that in most cases the whole of the young twig is destroyed makes the injury very much more serious.

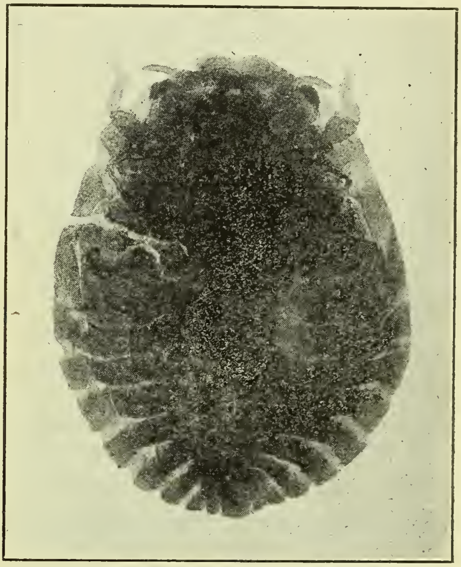
The Douglas Fir. The damage done by the form *coweni* on the Douglas fir has never been particularly noticeable, no deleterious effect on the health of the fir in the Park having been noticed. Only in one case outside Stanley Park, in a garden where a Douglas fir and Sitka spruce were growing alongside each other, the spruce being very heavily galled, did the needles of the fir show effects of heavy infestation later on in the summer. The nature of the damage on the fir is to cause the needles to curl and bend at the points of attack.

Natural Enemies. Syrphus fly larvæ and coccinellid larvæ have been observed feeding upon the pupæ in the galls, but not in sufficiently large numbers to produce any appreciable effects.

The President: We are very pleased to have this account of Mr. Chrystal's work from himself for the benefit of those who are here and who may know when I say that Stanley Park, in which Mr Chrystal is working, is one of our finest pieces of natural woodland in the whole Dominion, and is known to all foresters in Canada; but unfortunately, owing chiefly to the depredations of certain species of insects, its beauty is fast passing away. When I visited the Park last summer I was abhorred to find the enormous destruction which has been caused in a few years by various species upon which Mr. Chrystal has been working. They really are the reason of Mr. Chrystal's presence in Stanley Park. There are whole areas of hemlock there which are absolutely dead, places which Mr. Chrystal has named "the graveyard." I had with me Mr. James White, the Assistant Chairman of the Commission of Conservation, and we were able to demonstrate to him the enormous destruction of these trees by insect pests. I fear the time has nearly come when Stanley Park may no longer be considered Canada's most beautiful natural park. This paper is now open for discussion and perhaps Mr. Macoun, the Dominion Horticulturist, who is with us this morning, might have some remarks to make in regard to this paper.



Stem mother from Douglas fir.



Stem mother, from spruce.

Mr. Macoun: I am afraid I have not much to add to what you have said, Dr. Hewitt. Stanley Park is one of the sights of Canada and certainly everything possible should be done to preserve it.

Prof. Caesar: I would like to ask if this species is native to North America and also whether Mr. Chrystal has yet in mind any plan of a practical means of control.

Mr. Chrystal: Prof. Gillette states in his paper that on seeing the species of *cooleyi* he described it as a new species and said that this species was confined to the Rocky Mountain region. The state of the spruce in the Park was very bad; on careful examination about 60 per cent. were found to be beyond hope of control, but the rest could be sprayed, even to a considerable height.

Prof. Caesar: It is quite an interesting matter of observation at Guelph to note that *Chermes abietis* and *Chermes similis* have, the last few years, been almost totally controlled by some natural enemy. Since this western species is a native insect one would expect that sooner or later we should have natural means of control of it too.

Mr. Tothill: There has been an outbreak of presumably *Chermes* in New Brunswick. This outbreak was exceedingly conspicuous about three years ago and Professor Caesar will know fully well, the outbreak has been brought under complete control.

The President: If there is no further discussion on this paper we will pass on to the next and last of this session. There are really two papers but they will be taken as one and read consecutively.

THE CABBAGE MAGGOT—AUTUMN DEVELOPMENT IN BRITISH COLUMBIA.

(*Phorbia brassicæ.*)

R. C. Treherne, Field Officer, Dominion Entomological Laboratory, Agassiz, B.C.

The matter of autumn development in the life-history of the Cabbage Maggot is obviously of great importance in the control of this fly. On the basis of the knowledge obtainable in the autumn rests the question of autumn cultivation and the destruction of the refuse and debris resultant from the summer's crop. Still further great bearing will be obtained on the early spring development, inasmuch as little change is undergone by the spring by these forms entering upon the winter.

I do not propose, at this moment, to present all the information that has been obtained during the past few years in British Columbia on the life history and characteristics of this important pest, but merely to confine myself, in the time allotted, to a consideration of the developments that occur in the autumn.

Inasmuch as climate may offer changes and locality present differences, I shall confine myself strictly to conditions that prevail at Agassiz, B.C. (Lat. 49.15, Long. 121.40, 52 feet above sea level), which in themselves are comparable to the entire Lower Fraser Valley or what is known as the "Lower Mainland" of the Province.

It is my belief that opinions generally consider that the Cabbage Maggot Fly passes the dormant winter season mainly in the pupal state in the soil surrounding cruciferous roots or imbedded in the root itself. There are also opinions expressed from various quarters that there is a "possibility" that the fly may pass the winter in the adult condition. It is not my intention to enlarge on these expressions, but inasmuch as it is our duty to take careful observations in each locality where this fly is a pest and the growing of vegetable crops is a leading industry, I merely wish to offer a contribution on the life characteristics of the fly in the locality above mentioned.

Further I may say that up to the present we have little information in this Province on the habits of this fly and little knowledge, other than the generally accepted conceptions, on which to base the more approved remedial measures.

Without entering upon a detailed study of the complete life history of the fly, I wish to say that usually there are three complete and overlapping generations of this fly at Agassiz. It is possible for forms of the third generation to appear on the plants as early as July 18th, developing from the first eggs of each generation, while the second generation would ordinarily cease approximately about September 1st.

I will commence the discussion on the autumn development of this fly from this date, September 1st, and, in doing so, consequently, we will be dealing in all probability with third generation forms with a possibility that certain of the younger stages may belong to the fourth generation.

AUTUMN FLY EMERGENCE.

Cabbages and cauliflowers are harvested mainly in the months of August and September. During the past three years larvæ have been observed at times during each of the months of October, November and December working on roots of cruciferous plants. This year particularly an attempt was made to account for these larvæ and to solve the question of the hibernating form.

In the process of harvesting, therefore, collection was made of all pupæ seen and these were placed under observation in a sheltered place, but under supposedly equal atmospheric conditions as would prevail in the open field. One was struck during the course of the field observations with the preponderance of pupal forms over the larval, and one might easily suppose that given a cold wet autumn with low maximum and minimum temperatures that pupal forms would continue as such for the winter and larvæ would complete their growth and pass the winter as pupæ also. Detailed observations in an autumn of such a nature are lacking up till the present. As it happened, the past two years, 1914, 1915, when the notes herein presented were recorded, have been open and mild, during September and October. Such a condition is not out of the ordinary in this part of the world, thus the facts recorded are of interest.

From puparia collected, therefore, the following emergence of flies is recorded. It will be seen that the number of puparia under observation is increased on certain days. This is explained by the fact that harvesting operations were continuing and more pupæ were being collected and added to the number under observation.

TABLE 1.—AUTUMN FLY EMERGENCE.

Date	Number pupæ under observation.	Number of flies emerging.	Sex.		%
			Male.	Female.	
September 1st	137	1	1	....	.8
‘‘ 2nd	136	2	1	1	1.5
‘‘ 3rd	134	3	1	2	2.2
‘‘ 4th	131	0	....	....	0
‘‘ 5th	131	8	6	2	6.1
‘‘ 6th	123	0	....	....	0
‘‘ 7th	123	1	1	....	.8
‘‘ 8th	122	2	1	1	1.6
‘‘ 9th	120	1	1	....	.8
‘‘ 10th	119	7	5	2	5.8
‘‘ 11th	112	11	2	9	9.8
‘‘ 12th	101	0	....	....	0
‘‘ 13th	101	8	3	5	7.9
‘‘ 14th	93	5	1	4	5.3
‘‘ 15th	90 (2)	4	1	3	4.4
‘‘ 16th	96 (10)	6	4	2	6.2
‘‘ 17th	102 (12)	4	4	....	3.9
‘‘ 18th	108 (10)	2	1	1	1.8
‘‘ 19th	111 (5)	0	....	....	0
‘‘ 20th	111	9	3	6	8.1
‘‘ 21st	105 (3)	0	....	....	0
‘‘ 22nd	105	4	....	4	3.7
‘‘ 23rd	113 (12)	2	....	2	1.7
‘‘ 24th	117 (6)	5	3	2	4.2
‘‘ 25th	117 (5)	3	1	2	2.6
‘‘ 26th	114	5	3	2	4.2
‘‘ 27th	109	1	....	1	.9
‘‘ 28th	121 (12)	0	....	....	0
‘‘ 29th	121	0	....	....	0
‘‘ 30th	193 (72)	0	....	....	0

FLY EMERGENCE IN THE FIELD.

Inasmuch as the records given in Table 1 might have been influenced by unnatural conditions resulting from laboratory arrangements, the important point was to determine whether or not the same conditions were occurring in the field under strictly natural conditions. It was clearly proved that flies will emerge from September puparia under laboratory conditions, and, as will be seen later, eggs were being taken freely in the field. Hence it was probable that flies were emerging freely from the soil in the field. In order to determine this point careful examination of the roots of old cabbage plants was made. The roots were cut and the soil worked over to the depth of 6 inches. This was done on September 28th, 29th, 30th, and it was found that out of 78 plants examined, 48 plants were or had been infested. 30 plants did not show any sign of attack, and no puparia were taken. From the 48 plants, however, were found:

124 empty puparium cases from which flies had emerged.
96 sound and apparently healthy puparia.
14 large maggots more than 3 mm. long.
4 small maggots less than 3 mm. long.

Close examination for minute forms was not made, the important point being indicated that many flies were emerging in the field. It is hardly fair to claim a ratio between the empty puparium cases taken in the field with those under observation in the laboratory, because we could not be sure when the flies did emerge. However, the fresh nature of the puparium cases leaves no room for doubt that flies emerge freely from the soil during September.

Hence it is probable that Table 1 closely approximates the actual field conditions.

ADULT FLY MORTALITY.

Having satisfied ourselves that many flies emerge from the soil in September, several important considerations open up, viz., length of life of the fly, mortality, whether copulation occurs in autumn and eggs are laid, whether these eggs are fertile, and if so what happens to the young maggots, and lastly what proportion, if any, of the adults winter as adults.

The question of the length of life of the fly and the mortality is represented by the following table 2. The flies as they emerged, as indicated in table 1, were placed in 6-inch tubes and kept under observation in a shaded box under outside temperature conditions. Periodically they were examined for mortality and the live ones fed a little syrup and water solution. This table 2, therefore, has direct reference to the "sex" column on fly emergence as indicated in table 1. To interpret this table read horizontally for fly emergence and perpendicularly for date of death.

TABLE II.—MALE MORTALITY.

Date.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
September 1.....	1																			
" 2.....		1																		
" 3.....			1																	
" 4.....				0																
" 5.....					6															
" 6.....						0														
" 7.....							1													
" 8.....								1												
" 9.....									1											
" 10.....										5										
" 11.....											2									
" 12.....												0								
" 13.....		x			5x			x					3							
" 14.....			x		x									1						
" 15.....															1					
" 16.....																4				
" 17.....																	4			
" 18.....										x								1		
" 19.....																			0	
" 20.....	x						x			x			2x	x						3
" 21.....																				
" 22.....									x							x				
" 23.....																				
" 24.....																				
" 25.....										x			x		x	2x				
" 26.....																				
" 27.....											x									
" 28.....																x	x			
" 29.....										x										
" 30.....																	3x	x		2x
October 1.....																				x
" 2.....																				
" 3.....																				
" 4.....										x		(1 fly escaped)								

FEMALE MORTALITY.

Date.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
September 1.....	0																			
" 2.....		1																		
" 3.....			2																	
" 4.....				0																
" 5.....					2															
" 6.....						0														
" 7.....							0													
" 8.....								1												
" 9.....									0											
" 10.....										2										
" 11.....											9									
" 12.....												0								
" 13.....					2x								5							
" 14.....														4						
" 15.....															3					
" 16.....																2				
" 17.....																	0			
" 18.....																		1		
" 19.....																			0	
" 20.....		x	x								2x		2x	x						6
" 21.....																				
" 22.....											2x			x						
" 23.....																				
" 24.....																				
" 25.....			x								x		x	x	3x	x				
" 26.....																				
" 27.....											2x									
" 28.....								x		x	x									
" 29.....													x							
" 30.....													x					x		2x
October 1.....														x						
" 2.....																x				3x
" 3.....					escaped															x

From these records it will be seen that the length of life varies from 7-25 days in the autumn. This is of interest as the average life of an adult during the summer is approximately only 4.5 days.

It will be seen that all the flies in the above table 2, which emerged from puparia up till September 20th, died.

Those flies that emerged after September 20th (table 1 indicating that emergence continued until September 27th), were treated in a different manner. It was felt that 6-inch tubes hardly gave a fair test of longevity, hence a large wire mesh cage was arranged to give the flies more liberty of flight. The records follow on this experiment.

HIBERNATION OF THE ADULT.

As has just been seen a certain number of the flies that emerge as adults in the autumn live as long as twenty-five days, this period being passed in a six-inch vial. It was thought possible that the stage might be prolonged still more if the flies were allowed more room for flight and if this occurred we might persuade some of the flies to pass the winter in the adult condition. Accordingly a large cage was arranged consisting of wire mesh and suspended within was a large piece of rough fir bark, with many crevices into which flies might crawl should they desire to. This cage was suspended to the outside wall of the building. A small amount of sweetened water was placed on the floor of the cage, upon which, later, it was observed, the flies fed readily. No cabbage plant was introduced into the cage for fear the flies would be tempted to deposit eggs, and if they did so, their life functions would be over and they would probably die. Into this cage twenty-two flies of both sexes were liberated between September 22nd and 27th. Examination of the cage was difficult for fear of allowing the flies to escape. However, flies were observed dead on the floor of the cage on September 25th and finally on October 8th all the flies had died. On October 5th only six flies were observed dead on the floor of the cage, hence a rapid mortality must have occurred between the 6th and the 7th. The night of the 7th was the coldest night thus far experienced during the autumn, being 33 degrees F. This temperature may have killed the adults. At any rate we have nothing to offer which proves that flies winter over as adults although indications that such might occur were propitious. It might be noted again that no flies emerged from puparia after September 27th, despite the fact that 193 puparia were still confined on soil in boxes on that date.

I can only say that the number of flies experimented with in this instance was far too small to record an invariable and established fact I can merely say that those flies used did not survive the first touch of cold weather and hence did not pass the winter as adults. It might, however, be said with reason that it is highly probable that a small percentage of adults will winter as adults in a favorable season, although such has not been shown in our experiments thus far.

EGG DEPOSITION IN FIELD.

Not only do adult flies emerge freely from the puparia during September and probably part of October, but we find also that eggs are deposited equally freely during these months. These notes, recorded now, are a part of a long series of notes obtained throughout the summer on the question of egg deposition hence I shall not give the full details at this juncture. We are only interested now in the autumn development. To obtain this record 12 cabbages and 6 cauliflowers were examined daily between 4 p.m. and 6 p.m. and all eggs laid during the twenty-four hours removed by means of a knife blade and counted. By this method we would obtain an absolutely accurate record of the daily deposition. Further useful information may be deduced in reference to effects of temperature, sunshine, rain, wind, on egg deposition and the size and shape of the plant chosen for deposition.

The record follows in table 3. (For the sake of comparison the record of 12 cabbages is reduced to read for 6.)

TABLE III.—EGG DEPOSITION RECORD.

September.	No. of eggs on 6 cabbages.	No. eggs on 6 cauliflowers	Weather Notes.
1st	10	42	Morning, cloudy .... Afternoon, showers.
2nd	16.5	96	" fine .... " cloudy.
3rd	1	73	" fine .... " cloudy.
4th	15	116	" fine .... " fine.
5th	1	13	" foggy .... " dull.
6th	2.5	25	" cloudy .... " showers.
7th	3	24	" dull .... " showers.
8th	0	1	" rain .... " heavy rain.
9th	2.5	11	" fine .... " heavy rain and some sunshine.
10th	0	66	" fine and strong wind .... " fine.
11th	1	17	" fine .... " fine.
12th	7	15	Bright and sunny all day, night wet.
13th	0	0	All day cold and stormy.
14th	0	0	Warmer, but cool and cloudy.
15th	(no record taken)		
16th	0	10	Day fine, warm and sunny.
17th	0	49	Day fine, warm and sunny.
18th	0	21	Day fine, warm and sunny.
19th	0	32	Day fine, warm and sunny.
20th	9	61	Day fine, warm and sunny.
21st	10	38	Day fine, but smoky.
22nd	0	78	Day fine, warm, but dull.
23rd	(no record taken)		Showers fell throughout day.
24th	8	147	Day fine, warm and sunny.
25th	0	137	Day fine, warm and sunny.
26th	0	18	Day dull, but fairly warm; rain fell during the night.
27th	3	17	Morning dull; afternoon fair.
28th	6	80	Day fine and fairly warm.
29th	0	102	Day fine and warm.
30th	0	22	Morning dull, afternoon rain fell.
October.			
1st	(no record taken)		
2nd	(no record taken)		
3rd	0	99	Day dull with some rain.
		(33 eggs per day)	
4th	No further records taken on the cabbages	35	Day dull with slight sun, rain at night.
5th		15	Morning, fine; afternoon, bright and sunny.
6th		100	Windy, but fine and sunny.
7th		5	Day fine, warm, sunny; night coldest yet, 33° F.
8th		86	Morning sunny, afternoon dull and cloudy, night warm.
9th		1	Fine all day and sunny.
10th		48	Day fine and sunny.
11th		0	Rained.
12th		0	Rained.
13th		0	Heavy rain.
14th		13	Fine autumn day, cool but sunny.
15th		11	Fine autumn day, sunny, cool at night.
16th		11	Day fine, comparatively warm.
17th		0	Day mild but no sun.
18th	(no record taken)		
19th	(no record taken)		
20th		0	Dull and wet on past three days.
21st	(no record taken)		
22nd		4	Dull but mostly fine, rain in evening.
23rd		0	Rain.
24th		0	Showery.
25th		0	Dull with showers.

From this table 3, we find that flies were active up till as late as October 22nd; having since September 1st deposited 1,739 eggs on six cauliflower plants. The egg deposition on six cabbages for the month of September was 95.5, while the deposition on a like number of cauliflowers over the same period was 1,311. This indicates the importance of pursuing the life history on more kinds of plants than one. The records from cabbages alone would incline towards an entirely different rendering of the actual situation.

(See chart covering egg deposition on six cauliflowers.)

AUTUMN LARVAL NOTES.

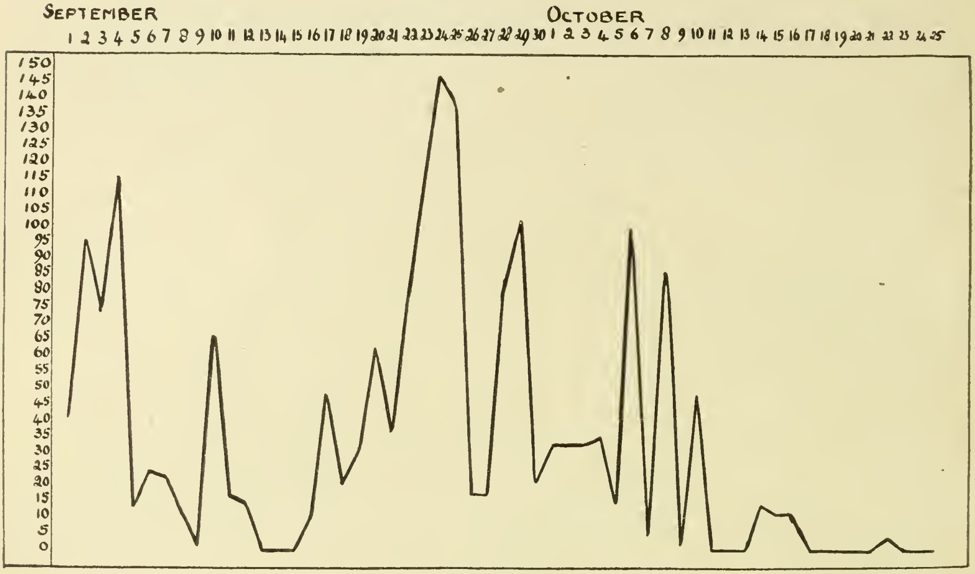
We are now satisfied, in the first place, that flies freely emerge from the soil in September, and in the second place that quantities of eggs are laid around plants until late into October. The high egg fertility percentage is maintained throughout the entire year, consequently we are justified in assuming that larval forms may be found working on the roots of plants during November and December. This assumption is supported by fact inasmuch as larvæ, freshly hatched, from late September eggs, having been placed on plants in pots, developed to 2 mm., 3 mm., and 4 mm. in length by the commencement of November. Inasmuch as these pots were sunk in the soil out of doors, we claim with assurance that the conditions were precisely natural.

Eggs taken from plants in the field between September 13th-26th, were hatched in the laboratory and placed on the soil around a potted plant (which was in turn sunk in the open soil), developed maggots 3 mm.-4 mm. long by October 25th. Larvæ hatching after September 26th and before 30th, treated in the same way developed maggots 2 mm. long by the close of October. There is no question of doubt that the larvæ found in both these instances would mature, pupate and pass the winter. It is true that no further notes were taken on them after this date, but their general thrifty appearance does not allow of much doubt that they will survive. Eggs hatching in October were also placed around the stems of plants and they developed slowly during the early days of November. Frost, it would seem, might affect them, especially the very small larvæ. Given no severe weather in November and December, there is, again, little doubt that October eggs will persevere also to puparia by the approach of winter. Real winter weather seldom sets in with any degree of permanence in this locality until the New Year.

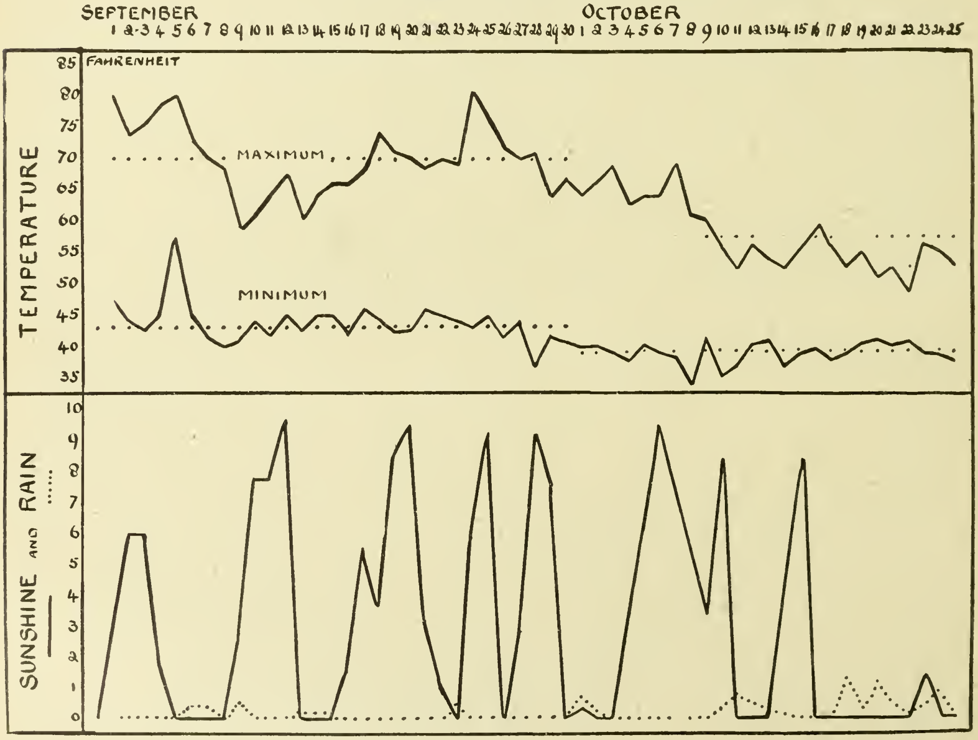
EGG DEPOSITION RECORD CABBAGE MAGGOT

CHART covering TABLE 3

ACTUAL FIELD DEPOSITION ON 6 CAULIFLOWERS



METEOROLOGICAL RECORDS



THE METEOROLOGICAL RECORDS.

The Meteorological records covering the notes given in this paper are as follows:—

	Temperature Degrees Fahr.		Sunshine in hours	Rain in inches
	Maximum	Minimum		
September 1st	80	47	....	....
“ 2nd	74	44	6.2	....
“ 3rd	76	43	6.4	....
“ 4th	78	45	1.8	....
“ 5th	80	58	....	....
“ 6th	73	45	....	.04
“ 7th	70	42	....	.03
“ 8th	68	40	....	....
“ 9th	59	41	2.5	.45
“ 10th	61	44	7.8	....
“ 11th	64	42	7.8	....
“ 12th	67	45	9.7	....
“ 13th	61	43	....	.08
“ 14th	64	45	....	.05
“ 15th	66	45	....	.14
“ 16th	66	42	1.5	....
“ 17th	68	46	5.5	....
“ 18th	74	44	3.6	....
“ 19th	71	43	8.5	....
“ 20th	70	43	9.5	....
“ 21st	68	46	3.1	....
“ 22nd	70	45	1.0	....
“ 23rd	69	44	....	.48
“ 24th	81	43	5.9	....
“ 25th	76	45	9.2	....
“ 26th	72	42	....	....
“ 27th	70	44	2.9	....
“ 28th	71	37	9.2	....
“ 29th	64	42	7.5	....
“ 30th	67	41	....	....
October 1st	64	40	.48	.61
“ 2nd	67	40	....	.12
“ 3rd	68	39	....	....
“ 4th	63	37	3.24	....
“ 5th	64	40	6.24	....
“ 6th	64	39	9.6	....
“ 7th	68	38	7.18	....
“ 8th	61	33	5.18	....
“ 9th	60	43	3.42	....
“ 10th	56	35	8.48	.12
“ 11th	53	37	....	.63
“ 12th	56	40	....	.57
“ 13th	54	41	....	.49
“ 14th	53	37	4.50	.12
“ 15th	55	38	8.48	....
“ 16th	58	39	....	....
“ 17th	56	37	....	....
“ 18th	53	38	....	1.22
“ 19th	55	40	....	.39
“ 20th	51	41	....	1.19
“ 21st	53	40	....	.52
“ 22nd	48	41	....	.15
“ 23rd	54	38	1.42	.36
“ 24th	55	38	....	.95

THE CABBAGE MAGGOT IN BRITISH COLUMBIA (*Phorbia brassicæ*).

THE NATURAL CONTROL BY PARASITES AND PREDACIOUS INSECTS.

R. C. TREHERNE, FIELD OFFICER, DOMINION ENTOMOLOGICAL LABORATORY, AGASSIZ, B. C.

The Cabbage Maggot fly is a very serious pest in the Lower Fraser Valley of British Columbia. Variations in prevalence occur one year with another, and certain locality differences are observed in any given season. These changes are not accounted for with any degree of satisfaction, but it is certain that autumn temperatures and precipitation play an important part in the conditions that arise the following spring.

The importance of this insect may be gauged by its long period of activity. Eggs may be frequently observed deposited on the stems of plants during the first week of April, and oviposition may continue intermittently but continuously until well in October. Nearly full-grown larvæ have been taken from roots in the closing days of April, and they may be found at all times until November and sometimes as late as December. These records were taken in the Lower Fraser Valley of British Columbia and apply only to that district, which ranges about 100 miles east of Vancouver. They are, further, notes gathered from three years' work with the fly, and are only given in this connection to indicate the serious possibilities that may follow an attack by the pest.

During the past summer an attempt was made to estimate the egg-laying proclivities of the fly. A number of plants, as indicated below, were examined every day, at the same time, from April 17th until October 26th. At each examination all eggs were removed and counted, so that as a result we find we have an accurate record of the total number of eggs laid per day throughout the summer. As an indication of the seasonal prevalence during the past summer, I may say that in a large experiment on control measures, out of 215 cabbages, untreated and used as checks, only 26 died strictly by reason of maggot attack (12.1 per cent.), and out of 210 cauliflowers, of the same nature, only 24 died (11.4 per cent.). Of course many plants were attacked and a diminution of weight was noticed at harvesting, but they survived the ordeal of the attack and a certain weight was recorded to their credit at the close of the season.

The fertility of these eggs, of which at least 2,500 were tested over the whole of the above period of time, was shown to be well over 80 per cent. This would indicate that if all the eggs as laid persevered through to puparia, the percentage of sound plants at the end of the season would be practically nil, despite the fact, as above noted, that the season was light in comparative prevalence.

Our field records, however, from careful root examination of both cabbages and cauliflowers, show clearly that during the past season rarely, if ever, were more than 25 larvæ and puparia found at any one time. In other years I have taken as many as 100 larvæ and puparia from single roots of cabbages, but not so this year, which is comparable to the egg deposition records in Table A.

The question then arises: What happens to all these eggs and small maggots?

One answer is that it is probable the larval mortality is high in the very early stages. I have experienced difficulty in bringing through young larvæ from the eggs under laboratory conditions, and further from observations taken on the movements of newly-hatched larvæ on the surface of the soil, I am convinced a great many never reach the roots at all. However, I am not prepared to say much on this point.

One may judge from these statements that the fly was not so serious as usual, but, nevertheless, under such a degree of prevalence it was found that large numbers of eggs were laid, as indicated in the following table:—

TABLE A—EGG DEPOSITION RECORD.

Crop. No. Plants.	Dates or Month.	No. of eggs deposited, removed and counted.	Basis of 1 plant.
25 Radishes	April 17th–May 31st....	3,437 eggs	137.5
*12 Cabbages......	May 21st–May 31st.....	86 "	7.
	For month of June	3,126 "	260.5
	July......	2,477 "	206
	August...	758 "	63.2
	September	155 "	12.9
	October...	....	....
			Total..6,602
* 6 Cauliflowers...	June 25th–July 31st	2,221 "	370.
	For month of August...	1,555 "	259.
	September	1,311 "	218.5
	October...	428 "	71.3
			Total..5,515

Another answer is that of the control by parasitic insects. On several occasions the Cynipid parasite *Cothonaspis gillettei* has been bred from puparia collected in the field. Unfortunately we cannot, from our study up to the present time, consider this parasite of any practical benefit in the control of the fly at Agassiz, B.C., its numbers are shown to be entirely too few. From the large numbers of puparia that have been taken and studied this past summer, only twelve Cynipid adults appeared. They started to emerge from puparia on August 16th and continued until October 18th. Further, there is little doubt that some carry over the winter within the puparia of the maggot to emerge in the spring.

Except for this Cynipid parasite, no other true parasite has been observed or recorded in British Columbia.

The third answer to the above question, and probably the most important, is the control by predatory insects and mites.

RED TROMBIDIUM MITE.

A Red Mite may very commonly be found on the surface of the soil in the vicinity of cruciferous plants. It has been shown by laboratory experiments that this mite will attack the eggs of the Cabbage Maggot fly. Several investigators have shown mites of this nature of great importance in the natural control of the fly, but our studies at Agassiz do not show that it is of such importance and not comparable in usefulness to certain Carabid and Staphilinid beetles.

Several Staphylinids are of importance, notably:

Orus punctatus Casey.
Xantholinus hamatus Say.
Hisperobium californicum Lec.,

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* (Cabbages and Cauliflowers transplanted on May 13th and 14th)

and several species of Carabids, notably, *Celia farcta* (1)*, *Bembidium mutatum* G. - H., *Bembidium trechiforme* Lec., *Platynus cupreus* Dej., *Pterostichus lucublandus* (2)*.

An attempt was made to determine the appetites of some of these predaceous insects. The following methods were used in determining this point. Ordinary small vials were employed in which single specimens of beetles were placed. A small piece of moistened blotting paper was also inserted in the vial and the whole tightly corked. Eggs of the Cabbage Maggot fly, freshly-hatched larvæ, and more mature larvæ of varying lengths were placed in the vial on the blotting paper ever so often, and allowed to remain with the beetle under observation. Daily records were taken over a certain length of time and the amount of material devoured noted. In this way we have the maximum appetite of the beetles recorded.

Another system was employed in which two ordinary microscopic slides were laid over one another and kept separate by means of a small strip of thin linoleum placed around three sides and glued on both sides to the glass. The fourth side was left open to be plugged with a piece of cotton wool. In this way we have a flat glass-encased chamber which may be easily handled and operated under the microscope. A little pulverised soil was then sifted into the chamber thus formed and the beetles to be observed placed within. Food was regularly supplied and the amount devoured recorded.

It may be seen from both these systems that the beetles were confined within a small area and that the food supplied had no opportunity of escape. Hence due latitude must be given the appetite record. Attempts were made to carry on the work under more natural conditions, but it was felt that the results recorded were of little value. It was too difficult to give the beetles full liberty of action and at the same time keep them under observation. Furthermore, it was impossible to discover whether a small newly hatched larva had been actually devoured by the beetle when given full liberty of action, or whether it had died a natural death. It is true that we devised a cage over some plants in the field, consisting of ordinary chicken wire mesh, which was entirely covered with cheesecloth, with the exception of a couple of inches on the ground surface. In this way the flies were prevented from oviposting and the ground beetles were allowed free access to the plants, and provided one knew how many eggs were around the plant at a given time, a series of notes on this point would offer some evidence on the matter of the natural control. However, even this method did not give the results expected.

I shall give, nevertheless, the results of the vial experiments, which may be taken to record the maximum appetite and the length of life of the beetles.

In this Table B the symbol "n, h, m," represents the words "newly-hatched maggots," while "l m" represents the words "large maggots." The figures in brackets in connection with these symbols represent the amount of food offered throughout the course of the beetle's life.

The species involved in this work are as follows:—

Type 1.—*Bembidium mutatum.*
Type 2.—*Bembidium trechiforme.*
Type 3.—*Pterostichus lucublandus.*
Type 4.—*Orus punctatus.*
Type 5.—*Xantholinus hamatus.*
Type 6.—*Hisperobium californicum.*

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* (1) Identified by Dr. E. C. Van Dyke.
* (2) Identified by Col. T. L. Casey.

All the Carabids were actually observed at work devouring maggots in the field, hence are predacious on the maggot under strictly natural conditions. The Staphilinids occurred in numbers in such close vicinity to infested roots, that there is little doubt they also are predacious under natural conditions. Their habits were mostly studied in confinement.

TABLE B—CARABID ADULT APPETITE RECORD.

Beetle Type No.	Vial No. Exp.	Food Consumed.			Life of beetle in days.	Food consumed per day.		
		n, h, m,	eggs	l, m,		n,h,m,	eggs	l, m,
1	1	305 (352)	53 (71)	7 (13)	51	6	1	.5
	14	262 (319)	34 (46)	½ (8)	81	3.2	.4	.09
2	4	210 (308)	82 (116)	7 (19)	120	1.8	.8	.006
	6	51 (79)	21 (31)	2 (4)	12	4.2	1.9	.18
3	21	....	....	10 (23)	10	....	....	1.

STAPHYLINID ADULT APPETITE RECORD.

4	2	497 (549)	78 (128)	1 (19)	87	5.7	1	0
	5	12 (12)	17 (22)	0	3	4.	6	0
	7	16 (25)	19 (38)	0	12	1.3	1.6	0
5	3	242 (313)	73 (112)	10 (22)	120	2	.2	.1
	9	185 (226)	10 (29)	0 (4)	76	2.5	.2	0
	10	165 (227)	45 (63)	0 (2)	51	3.2	.9	0
6	17	....	....	2 (5)	4	....	....	.5

To interpret the Table B correctly it is necessary to understand that the beetles were offered food according to what happened to be on hand to feed them, and further that on several days the beetles were deprived of their favorite food, i.e., small maggots and eggs and were fed on large maggots. In this way, in the first place, therefore, they were not allowed to choose their own food, hence the above record does not indicate any special choice of food, and in the second place while the beetles lived for some considerable time, part of that time they were starved, in the effort to induce them to devour the large maggots, hence the appetite record is lower per day than it would be if the diet had consisted entirely of small maggots and eggs.

The detailed daily record of these several beetles makes exceedingly interesting reading from the original notes. I do not consider it possible to include them in this paper, or to publish them in the proceedings, as they would occupy too much space. The Table B gives merely the bald statements without those fine points of interest incident to the feeding.

CONTROL BY PREDACIOUS LARVÆ.

In addition to establishing the appetite record of the adult beetles, both Carabid and Staphilinid, an attempt was made to mature carabid larvæ. Carabid beetle eggs may frequently be seen on the soil surface, and at different times some of these were taken from the field, at other times some eggs were deposited in the tubes in the laboratory. Poor success seemed to attend the hatching of these eggs, and in fact many disappointments were encountered in bringing the larvæ to maturity. Without detailing all these troubles I will relate some of the facts obtained. The eggs and larvæ of these beetles were handled in the same way as the adults, in vials, etc.

TABLE C—CARABID LARVAE APPETITE RECORD.

Vial Exp. No.	Size of larva in mm.	Food consumed.			Remarks.
		n, h, m,	eggs.	l, m.	
11	hatched from egg	....	5 (5)	......	Larva died, having eaten 5 eggs in 2 days.
20 & 22	8 x 1	79 (100,	....	6½ (20)	2 Larva lived 20 days, having eaten per day 4 n, h, m, and 1 2 mm. maggot.
8	9 x 1	6 (6)	17 (37)	0	Larva died in three days.
12	9 x 1	2 (2)	4 (18)	......	Larva moulted and then died after 2 days.
15	12 x 2	....	7 (11)	4 (9)	Larva died after 3 days.
18	16 x 2	0 (20)	....	8 (28)	Larva died after 18 days, eating about 1, 2, 5 mm. maggot per day.

SUMMARY.

Even from these records it is impossible to state with accuracy the actual appetite record of any predacious beetle or its larva. The limitation in the manner in which the work was done does not allow us to form any definite conclusion.

We are justified in stating, however, that despite the artificial methods employed, these predacious beetles present an immense aid in the control of the maggots. Their voracious appetites in confinement and from the fact that they did not hesitate to attack the food offered clearly proves some marked similar action in nature. Further than this, on many occasions, both Carabid and Staphilinid beetles, and the larvæ, at any rate of the former, may often be found embedded in the roots of plants in close association with maggots, and have been observed actually at work devouring maggots. The actual amount of food they dispose of in a day or throughout their life is the point of which we cannot be too sure from the records obtained. We might, however, be perfectly justified in assuming that five eggs or five young maggots a day would represent a normal appetite. We have also seen that a beetle will live with food for four months (120 days). On the above ratio it will destroy about 600 eggs or young maggots. This in itself would just about equal the number of eggs deposited by a fly on a single plant in a season, under conditions we have mentioned. Possibly this may be a little high, but nevertheless, we cannot avoid the fact that the percentage of usefulness of these little beetles is exceptional, and of unquestionable value.

The President: There are so many points to be discussed in these papers that I think it would be best to postpone the discussion until this afternoon, when we will have more time, and when Mr. Treherne will have more time to bring out certain points.

FRIDAY, NOV. 5th.—AFTERNOON SESSION.

The President: We will now commence the afternoon session and will first take up, before proceeding with the regular business, the discussion which was postponed this morning of Mr. Treherne's paper on the Cabbage Maggot. This paper is now open for discussion.

Mr. Tothill: I would like to ask if the headings "May," "June," "July," "August," and "September," etc., represent generations?

Mr. Treherne: Not in this chart. As a matter of fact, there are at least three generations of this maggot in British Columbia; the first generation ends about the end of May, the height of the second generation is early in July, and the third generation towards the latter part of August.

Mr. Burgess: I would like to ask Mr. Treherne if he has any definite records of the maggot coming through any stage in the winter.

Mr. Treherne: We have no larval or adult records of hibernation, but only as yet pupal records.

Mr. Gibson: With regard to the question that Mr. Burgess has asked, last year and the year before we made observations at Ottawa in the hope of getting further information as to how the insect passes the winter. We found the puparia abundantly in an old turnip field at varying depths, the lowest being nine inches below the soil. We only found what we considered the larva of the Cabbage Maggot fly in one instance, in April. The species in Eastern Canada most probably hibernates to a more or less degree in the larval stage, in addition to the regular hibernating form, namely, the puparium.

The President: The only other point, I think, which might arise from this paper which might be discussed is the comparative absence of internal parasites, particularly the absence of Staphilinid parasites such as we find in the East.

We will now proceed to the business meeting of this session, which consists in the election of officers. As in the case of last year, the Council in order to facilitate the proceedings of the meeting has recommended a list of officers for the guidance of the meeting, and I might ask the Secretary to read the list of officers as selected by the Council:—

President, Mr. A. F. Winn; Vice-President, Prof. L. Caesar; Secretary-Treasurer, Mr. A. W. Baker; Curator, Mr. J. B. Spencer; Librarian, Dr. Bethune; Directors, to be re-elected, with the exception of Division No. 6, where J. W. Noble is recommended.

Dr. Fyles: It gives me very great pleasure to nominate Mr. Winn as President of the Entomological Society. I have followed Mr. Winn's work for a number of years, and think he is fully capable of holding the position.

Mr. Morris: I second the motion.

Dr. Hewitt: It has been moved and seconded that Mr. Winn be elected President of the Society. I am sure it is a matter of great gratification to all Mr. Winn's fellow workers to see him occupying the Presidential chair. We all appreciate the work which he has done in the Province of Quebec, especially in the production of those excellent insect lists which he is getting up. There being no other nominations, I declare Mr. Winn duly elected. I will call now upon Mr. Winn to take the chair.

Mr. Winn: I certainly do not deserve this honour. I never got it correctly into my head how I came into this office. Two years ago the Fiftieth Annual Meeting was held at Guelph and I was on hand. About two months later Mr. Gibson surprised me by telling me that I had been elected Vice-President, and as it was then too late to undo what seemed an inexplicable error, I came to the conclusion that an honour to the Montreal Branch, with which I have been connected since a schoolboy, was intended rather than on account of anything I may have been able to accomplish personally. It has been suggested to-day that in reality it is a form of punishment meted out for not attending all our meetings regularly.

In some of our sessions reference has been made to the work of professional or practical entomologists, and that of amateurs, who by inference are unpractical, as if there were two well marked divisions. Really I do not think such a distinction exists except in the application of the results obtained. If it does exist, I hope it will cease and that our Society will remain united from Atlantic to Pacific as we see it here to-day, and that some of those who attended our fiftieth anniversary will also be present at the one hundredth.

There is one point in particular that both the so-called divisions agree upon, and that is the importance of learning the life-histories of insects from the egg to the perfect stage, and this has been emphasized in nearly all the papers we have been listening to. This point reminds me of a matter about which I had some correspondence with Dr. Bethune a few years ago—the question of having a suitable crest and motto to use in connection with a book-plate, for, old as our society is, it cannot boast of owning either, "Ab ovo usque ad imaginem"—from egg to imago. No particular insect was mentioned to serve as an emblem, and as I do not know what views the members have on the subject, suggestions would be acceptable.

I feel sure, however, that thoroughness in following out the life-histories of insects, thus getting at the bottom of things, is one of the most important objects to keep before us, for we do not really know an insect till we know it in all its stages.

I shall not take up any more of your time except to thank you very sincerely for the honour conferred upon me.

The President: I think all who have had to do with the society have been impressed with Professor Caesar's ability. I do not think we could have a better Vice-President in support to Mr. Winn than Professor Caesar, and I have much pleasure in moving that Professor Caesar be elected Vice-President.

Seconded by Mr. Swaine. (Carried.)

(For complete list of officers see p. 6.)

Mr. Winn: I will now ask Mr. Sanders to read his paper on "Some of the Methods followed in Nova Scotia in controlling the Brown-tail Moth."

Mr. Sanders' paper read.

SOME OF THE METHODS FOLLOWED IN NOVA SCOTIA IN CONTROLLING THE BROWN-TAIL MOTH.

G. E. Sanders, Field Officer for Nova Scotia, Dominion Entomological Laboratory, Annapolis Royal, N.S.

The control of the Brown-tail Moth in Nova Scotia presents many difficulties peculiar to that Province which go to show in rather a striking manner the value of investigating each insect locally, in the light of a knowledge of local conditions and methods, extending even to such details as the method of fixing charges for packing out the staple crop in the warehouses.

The Brown-tail Moth has not yet become established in the forest areas of Nova Scotia, 92.6 per cent. of the total number found in the Province being on fruit trees; the few found on ornamental and forest trees being on trees near to or in orchards.

Area Infested.

The area infested with Brown-tails is about two hundred miles long and some thirty miles wide, including the Counties of Shelburne, Yarmouth, Digby, Annapolis, Kings, Hants and Cumberland; or, in other words, all but one of the Counties of Nova Scotia touching on the Bay of Fundy.

This area may be divided roughly into four districts, in each of which we have a different proposition. In the first district, which includes Cumberland, Shelburne, Yarmouth, and all but a small section of the east end of Digby, we have small orchards averaging less than twenty apple trees each; usually the orchards are separated from each other by strips of woodland or open fields. As apples in this section are grown on a very small scale, as a rule for home use only, practically no spraying is done.

In the second district, which includes Eastern Digby and Annapolis County as far east as Annapolis town, we find apple trees in profusion. This district was settled about the time of the American Revolution, and many old, gnarly trees remain of the orchards planted by the original settlers. The land throughout this section is full of granite boulders, and in common with all such land in Nova Scotia and roadsides, fence-rows, pastures, and even scrubby woods are filled with seedling apple trees of every age and description. As this district is for the most part the west end of the Annapolis Valley, it falls into the regular fruit district and the orchards are of moderate size, covering probably one-tenth of the cultivated land, and adjoin each other quite closely. In spite of the natural advantages that this section possesses in the production of fruit, very little care is taken of the orchards, not more than 5 per cent. of the trees being sprayed.

The third district extends from Annapolis to Middleton. The western end of this section is granite land similar to the second district, and seedling apple trees are to be found everywhere. Over 50 per cent. of the cultivated land is in apple trees, so the whole district is practically one continuous orchard. About seventy per cent. of the orchard in this district is sprayed.

The fourth district extends from Middleton to Windsor, and includes the largest orchards in Nova Scotia, probably sixty per cent. of the cultivated land being in orchard, with the exception of a small section south of Wolfville, seedling apple trees are almost unknown. The orchard is for the most part less than fifty years old, orchard that a man can spray or inspect for Brown-tail easily: and, according to Prof. Brittain's census, some 87 per cent. of the trees in the district are sprayed.

COMPARISON OF CONTROLS.

In the first district, Yarmouth and Digby Counties, where the orchards are small and widely scattered, we find it very easy to control the Brown-tails by having our inspectors pick the nests from the trees in the winter. One inspection of this district can be relied upon to give a decrease in ordinary years, the only increases coming from the adult moths, which occasionally are blown across the Bay of Fundy into the district from the New England States. This district is on the whole flat country, and the normal increase very small. Evidently the adult moths are for the most part blown out of the orchards in which they originated, and the orchards being scattered they perish before they find other apple trees.

In the fourth district, Kings County, etc., the orchards are large and practically continuous, so if a moth is blown out of one orchard it will more often than not blow into another. In spite of this the large amount of spraying done, and the scarcity of seedling trees makes it quite easy for our inspectors to keep the Brown-tail within reasonable bounds. Occasionally we have small outbreaks in the western end of this district, but a little persuasion usually results in the orchards being sprayed and the Brown-tails exterminated.

In the third district, which is situated in the eastern end of Annapolis County, where 30 per cent. of the orchard is unsprayed and we have a great quantity of wild seedling apple trees, we have great difficulty in controlling Brown-tails. In many sections we have had very large increases which we followed up by very careful work, often persuading the owners of the worst orchards to spray, and so obtained decreases in infestation.

In the fourth district, or Western Annapolis County, with practically no spraying, medium-sized orchards and plenty of wild seedling apple trees, we have had great difficulty in holding the Brown-tails. Practically all of the work there has been done by our inspectors with no appreciable assistance, either in spraying or in picking nests, from the inhabitants.

NORMAL INCREASE IN NOVA SCOTIA.

The coldest season ever recorded in Nova Scotia was 1913-14. The extreme low temperature in the Annapolis Valley was—21F. at Kentville, while at Yarmouth the lowest was —6.4F.; in the most heavily infested district, *i.e.*, near Annapolis, the lowest temperature ran —19F. and less here. Brown-tails came through with an average of about 40 per cent. winterkill. Counting the actual number of nests within twenty-five yards of old nests found in 1914-15, including those that gave no progeny, we found the actual increase the Province over to average 6.3 new nests from each old nest—this was not counting the number of female moths that had blown over twenty-five yards from the old nests. The increase in ordinary years is much larger than this.

WINTER DROP OF NESTS.

Formerly we started the inspectors at their winter work on January 1st, but we found at that time a very large proportion of the nests hanging by a thread, and a few of the nests gone, leaving a bit of web attached to the tree where the nest had been. We placed some nests on the ground and found that the young larva lived over in them with a very small winterkill. In fact, at one station where all of the Brown-tails suspended in the air were killed by the winter, those on the ground lived over with only a small winterkill, having been protected from the extreme cold by the deep snow.

The questions that arose from this were: The proportion of nests that dropped from the trees, when they dropped, and whether the larva which lived over in the dropped nests would reach the trees from which they fell. We have not by any means finished these lines of enquiry, but we have one year's work on each, which shows up their importance.

On November 1914-15 we tagged a number of nests in each of two orchards, and in one we got 10 per cent. dropped during the winter, and in the other 25 per cent.

In regard to the time that the greatest drop takes place the heavy gale of Sept. 26, 27, 28, 1915, loosened a great quantity of nests, but the greatest drop appears to take place in November and December, soon after the leaves fall, and continues to a certain extent all winter. The heavy gales break down the nests and cause them to start swinging, but do not actually blow as many off the trees as one would expect, but the lighter winds following, constantly twisting the nests about, gradually wear the thread off and cause the drop to be spread quite evenly over the whole season.

In regard to the young larvæ in the dropped nests finding the trees, we found, from nests placed equidistant from four trees in an orchard planted 35 by 35 feet, that 11 per cent. of the larvæ contained in the nests found the trees and ascended to a tanglefoot band placed to catch them. The spring weather influences the movements of the young larvæ to a very great extent. In bright weather the larvæ will travel over the ground due south, toward the sun; in cloudy weather, such as we had when the larvæ were emerging in 1915, they will travel in any direction.

These preliminary investigations would indicate the importance of removing as many nests as possible before the nests begin to drop from the trees. These views are supported in practice by the ease with which the Brown-tails are controlled in districts where the drop is light, as compared with districts where the drop is heavy.

We now start our inspectors on November 1, when the leaves are about 90 per cent. off the unsprayed orchards, but have scarcely started to come off the sprayed orchards. They work the unsprayed orchards in the most heavily infested territory first, trying to get just as many nests as possible off the trees as quickly as possible, returning later to work every tree and bush in the district, and, if they have time, to return a third time to go over the trees again. As light and moisture conditions often prevent the best work being done in many orchards, a second thorough inspection is found to be of value in the most heavily infested localities.

Fall Picking of the Nests.

We have found that a large proportion of the winter nests can be gathered by the pickers when picking the apples in September and October, the cluster of brown skeletonized leaves that the larvæ feed on when forming the winter nest showing up for a foot around the nest against the dark green of the tree. At the beginning of the season we published notes in the papers requesting growers to have their pickers look for these clusters of leaves and destroy the nests when found. We have already had reports of a large number of nests collected and destroyed this season by the pickers.

Educational Work.

In addition to having our ten inspectors collect as many nests as possible from the trees, we plan to have them carry on as much educational work as possible, in order to persuade growers to examine their own trees and collect Brown-tail nests and to spray. All of our inspectors have all available data in regard to spraying right at their finger tips, and they are instructed to see the owner of every property giving over five Brown-tail nests, and endeavor to get him to spray his trees the next season.

More Spraying Campaigns.

The one thing outside of the work of our own inspectors in collecting nests that has had an appreciable effect in Brown-tail control has been the campaign for more spraying. In this we have the co-operation of the United Fruit Companies, whose warehouses extend over the whole fruit district, and of the Dominion Fruit Inspectors, who, under the Dominion Fruit Commissioner, Mr. D. Johnson, are now inspecting most of the fruit in the orchards and warehouses instead of at Halifax, so they come in direct contact with the growers and are a tremendous power in causing more spraying to be done. I am this winter spending two or three days with each of these inspectors, visiting warehouses, etc., and keeping them supplied with data on spraying. Mr. Johnson tells me that he wants his inspectors to be an educative rather than a police force—that they can do more good in showing people how to grow better fruit than, as he puts it, "going at the grower with a club to fine him if possible."

This attitude deserves the very highest commendation, and in teaching the Nova Scotia growers how to produce good fruit he must teach them how to control Brown-tails, for spraying, which controls the Brown-tail, is absolutely necessary in the production of good fruit in Nova Scotia.

The manager of the United Fruit Companies, Mr. A. E. McMahon, and his officials have been untiring in their efforts to get more and better spraying done, and their work has been particularly effective. About 60 per cent. of the total crop of Nova Scotia is handled through the 48 warehouses of the Companies, and all of the spraying material for their members is purchased by them. On their 60-ton order of lead arsenate, with other spraying material in proportion, they are able to get the very finest prices possible, and they give their members the full benefit of these prices and sell to non-members at a price that will barely cover expenses, preferring to take their profit in the benefits their members will receive from having their neighbors spray. The Fruit Companies' Inspectors, who visit every warehouse at least once a week, the warehouse managers and the packing foremen are every one active advocates of spraying, and persuade a great many people to spray by calling them into the warehouse when their poor lots are being packed out and comparing them with other well-sprayed lots.

The companies are also proving themselves of great value in the spraying campaign, by changing the methods of charging the cost of packing. In all of the warehouses, no matter under what system they are run, the culls, owing to the difficulty in apportioning them, are confiscated by the company and sold to be credited against general cost of packing. In most of the old companies the members were charged on the pack out of apples, that is, a member who delivered 50 barrels of apples from the trees which packed out 40 barrels of shipping apples, paid the same as the member who delivered 100 barrels, which packed out 40 barrels of shipping apples, the culls in both cases being confiscated, the larger amount of culls about offsetting the extra cost of packing. In some of the last formed companies the cost of packing was charged on the number of barrels delivered at the warehouse, so that the man who delivered 50 barrels which packed out 40 paid only one-half as much as the man who delivered 100 barrels which packed out 40, the culls still being confiscated. The companies that operated under this last system had no difficulty in persuading their members to spray. When a man has to buy a barrel costing 26 cents for cull apples, pay 20 cents per barrel for having them handled, and then have the apples confiscated, it is quite easy to persuade him to spend 15 cents per barrel on spraying, and make shipping apples of them. Where the last system is operating, spraying is increasing rapidly, and the executive of the United Fruit Companies are gradually persuading the subsidiary companies to change over to the last system, as they find it the very strongest argument they can use in getting more spraying done.

These three complete and far-reaching organizations, some of which are in direct personal touch with almost every fruit grower in the valley, at least once a month have, to use a military phrase, "to be kept in ammunition." We are carrying on a number of experiments and observations to find out just what insects are doing the most damage, the extent to which each can be profitably controlled, the profits derived from controlling them; the actual cost of spraying; the best nozzles to use and the best materials to use. In this work we have the co-operation of the Provincial Entomologist, Prof. W. H. Brittain, who has taken over the investigations on the sucking insects of the apple, leaving the biting insects to the Dominion Laboratory. We have demonstrated that in an ordinary orchard in the Annapolis Valley, the benefit derived from controlling bud moth, fruit worms, and Codling Moth will pay for the entire cost of spraying, at least twice over; in addition the grower has his insurance against blackspot or scab free, and the most progressive of the Nova Scotia growers are now realizing that they cannot operate an orchard profitably in the Annapolis Valley without spraying.

NEWSPAPER WORK.

The *Co-operative News*, a paper conducted by the United Fruit Companies, and mailed to every one of the members of the Companies, or about sixty per cent. of the growers in the Annapolis Valley, twice a month, has reserved a page for any articles we may choose to write or solicit on spraying problems. By this means we are able to publish timely articles, give advance notice of insect outbreaks and methods of combatting them, as we will do with the Tussock Moth next season; give the growers the benefit of our findings just as soon as we are sure of our results, and have our papers and articles in handy form for the use of our inspectors, in carrying on their personal canvass for more and better spraying.

The work in increasing the amount of spraying, we realize, is the most important part of the work of controlling Brown-tail in Nova Scotia, and a large portion of the summer is devoted to spraying experiments and demonstrations, in order that we may devise the most economical sprays possible for Nova Scotia, as the cheaper and more effective the spray is, the more growers we can persuade to use it.

SPRAYING TO CONTROL BROWN-TAILS IN THE FALL.

For two years we have been working on the possibility of controlling Brown-tails with the last summer spray, and this year we demonstrated that where arsenate of lead is used with Lime Sulphur in the last summer spray, or that applied from June 28th to July 15th, the poison will adhere to the leaves enough to poison the young Brown-tails when they emerge from the egg and start feeding in August.

Parasite Work.

In addition to the spraying, which will control more and more Brown-tails every year, as the amount of spraying increases, Mr. J. D. Tothil, of the Entomological Branch, is supervising the colonizing of the various parasites. Besides the colonizing of parasites, we have devised in Nova Scotia a practical means of preventing the reducing in numbers of the imported parasite *Apanteles lacteicolor* by the destruction of the winter webs of the Brown-tail. We build a large matched board cage, about 5 feet high, 6 feet wide, and 12 feet long with an open top and earth floor; two narrow boards are placed edgewise on the inside, and tanglefoot placed on the underside as in the Fiske tray. All of the Brown-tail webs collected are saved, and each of these cages stocked with two or three thousand of them. The Brown-tails are fed on short, leafy twigs for about three weeks in the spring until the first Apanteles larvæ emerges to spin its cocoon, then they are fed on willow catkins three or four times a day, giving them plenty of food so as to have as little Brown-tail web as possible in the food containing the Apanteles cocoons. The willow catkins seem to be the best material we can find for the Apanteles to pupate in. After about one week's feeding on catkins and the majority of the Apanteles have emerged, we feed broad leaves of some sort, heavily dusted with Paris green. Two days feeding will usually kill all of the Brown-tails, and then the green poisoned leaves can be rolled off to one corner and the willow containing the Apanteles cocoons exposed, so that the adults can fly free as soon as they emerge.

OBSERVATIONS ON THE BROWN-TAIL AND GIPSY MOTH SITUATION IN RELATION TO CANADA.

J. D. Tothill, Field Officer, Dominion Entomological Laboratory, Fredericton, N.B.

The parasites and predators that Mr. McLaine has just spoken of are being introduced of course as a measure of protection against possible injuries in Canada from the Gipsy and Brown-tail Moths.

How great a nuisance these two insects could become under Canadian conditions is not known. The farther north they travel the more vigorous will be the climate and the general conditions for existence. Somewhere between their present range and the arctic zone they will cease to be injurious. If the exact location of this "somewhere" could be precisely forecasted, fewer difficulties would no doubt be experienced in dealing with the spread of the infestation in the future.

The Brown-tail Moth, the less serious insect of the two, is now endemic in the transition zone of Nova Scotia. This indicates that this insect could become, if once established, a serious pest in all parts of the Dominion falling in this zone. In the middle west, however, food supplies would be inadequate and the insect would not be expected to flourish. The endemicity of *Euproctis* in the transition zone of Nova Scotia indicates, therefore, that the insect would also be a pest in the transition portions of British Columbia, Alberta, Ontario, Quebec, New Brunswick, and Prince Edward Island, if it once became established in any of these places.

In boreal parts of New Brunswick, and most of the Province is boreal, the same insect is epidemic. It remains to be seen whether or not it will become endemic.

The Gipsy Moth is a very serious shade tree and forest insect of the transition zone. It would undoubtedly flourish were opportunity afforded in the transition zone of Canada, excluding again that part of it falling in the treeless region of the middle west.

The behaviour of this insect in the boreal life zone cannot be forecasted. In this zone Mr. F. H. Mosher has shown that the insect would have an abundant food supply. It is also known that the insect hibernates successfully in boreal parts of Northern Maine. These two straws seem to show the direction in which the wind is blowing; they seem to show that there is a very grave danger menacing over immense boreal forests from attacks by this insect.

It is primarily to affect this seeming danger that the parasites and predators are being introduced.

They are being hibernated at strategic points, that is at points in Canada nearest to the infested area in New England and nearest to international trade routes. One of these points is near the international boundary in southern Quebec; another is in New Brunswick, and a third in Nova Scotia.

During the last four years large numbers of these beneficial insects have been introduced at these places. One of these species, *Apanteles lacteicolor,* is doing well in its new environment; another, *Compsilura concinnata,* is expected to be doing well, the third, *Calosoma sycophanta,* is known to be at least holding its own.

These same insects in New England are now helping materially and perceptably to relieve the situation.

It is hoped that by the time the Gipsy Moth reaches the Dominion there will have developed a living wall of its natural enemies strong enough to prevent disastrous results.

THE WORK CARRIED ON IN THE UNITED STATES AGAINST THE GIPSY AND BROWN-TAIL MOTHS.

A. F. Burgess, in Charge of Moth Work, Bureau of Entomology,
United States Department of Agriculture.

The Gipsy Moth and Brown-tail Moth work in New England, as most of you know, is carried on in each State concerned by State and local agencies. Work to prevent the spread of these moths outside the territory where they now exist is maintained by the United States Department of Agriculture through the Bureau of Entomology. All of the work is of importance, as upon its thoroughness depends the chances of these insects spreading rapidly to the Dominion of Canada. The Brown-Tail Moth flies strongly and is attracted to lights and has already become established in districts in Nova Scotia and New Brunswick. The Gipsy Moth does not spread in the adult stage, but the small caterpillars may be carried long distances by the wind. Greater spread of this insect is shown toward the north and north-west. This is due principally to the fact that the prevailing warm winds during the time the small caterpillars are active blow from the south and south-east. A large number of men are employed in the outside part of the territory to scout the area for the purpose of determining how far the gipsy moth has spread and to treat carefully the infestations in the outside towns. This work consists, aside from scouting and creosoting of egg clusters in the winter, of thinning out infested areas where trees are growing too closely, or where the stand is of favored food plants, and of destroying the caterpillars in the spring and early summer by the use of arsenate of lead spray and the application of bands of tanglefoot. This work has an important bearing on the spread of the Gipsy Moth. If tanglefoot bands are applied to trees before the caterpillars hatch it serves to keep any of those that may hatch from egg clusters on the ground from climbing to the tops of the trees and being blown long distances and establishing new infestations.

The territory inside the area known to be infested by the Gipsy Moth as well as that infested by the Brown-tail Moth, has been placed under quarantine by the Federal Horticultural Board, in order to prevent the shipment of trees or plant products which might disperse these insects to uninfested territory. For the purpose of enforcing these quarantines the infested territory is divided into sections in each of which an inspector is located, whose duty it is to examine all such plant products, as well as stone and quarry products which are shipped outside the infested area. This work has prevented the dissemination of the Gipsy Moth and Brown-tail Moth to many widespread areas. In connection with the inspection work, as related to the Brown-tail work, it should be of interest to residents of the Dominion to know that during the past three years inspectors have been maintained at junction points where long distance trains have passed out of the infested area in order to examine the trains and destroy any Brown-tail Moths that might be attracted to the lights. Large number of moths have been destroyed as a result of this work, especially heavy infestations having been destroyed on trains passing through White River Junction, Vermont, north bound.

Other phases of the work carried on by the Bureau of Entomology are largely experimental.

Silvicultural experiments are being carried on to determine the most resistant stands and the best composition of tree growth to withstand continued Gipsy Moth attack.

The parasite work was first begun in Massachusetts by a co-operative arrangement between the State and the United States Department of Agriculture. Parasites attacking these insects in different stages were imported for several years from Europe and Japan, and up to the present time, several species have become firmly established, and progress has been made toward checking the increase of these pests.

As has already been stated by Mr. McLaine, three of the species concerned, namely, *Apanteles lacteicolor, Compsilura concinnata,* and *Calosoma sycophanta,* have been introduced into Canada during the last two or three years, as a result of a co-operative arrangement between Dr. Hewitt and the Bureau of Entomology. These species have become so abundant in certain sections of the infested area that they can be collected in considerable numbers in the field, and they are secured in this way for colonization in areas where the species are not known to exist. This work is also being done by the Bureau in order to bring about the rapid establishment of these insects in the infested area.

Apanteles lacteicolor, which is a parasite of the Gipsy Moth, as well as of the Brown-tail Moth, has been colonized over practically all the area where these species are now known to exist. During the past year, many colonies were liberated in eastern Maine, and it is not considered necessary to make liberations next year.

Compsilura concinnata has been colonized over a slightly smaller area. It attacks both the Gipsy and the Brown-tail caterpillars, and more colonization will be necessary, particularly in eastern Maine next summer.

The spread of *Calosoma sycophanta* has been slower than the other species previously mentioned, although they are present in practically all the territory that is badly infested with the Gipsy Moth. Further colonization will be necessary next summer.

In addition to the parasites already mentioned which are the most prominent that have been liberated are two parasites of Gipsy Moth eggs, namely, *Anastatus bifasciatus* and *Schedius kuvanœ* which are doing excellent service. These tiny insects spread slowly, hence it is necessary to liberate large numbers of colonies. By the end of another season it is hoped that the area most heavily infested with the Gipsy Moth will have been thoroughly colonized with these species.

Since the work was begun at the Gipsy Moth Laboratory, an effort has been made to learn as much as possible concerning the life history and habits of the parasites introduced, as well as their behavior, both under laboratory and field conditions.

The principal effort that has been made, however, has been to secure all information possible that had any bearing on the methods of successfully colonizing the species in the field, and obtaining information which would enable the work to be intelligently handled.

Since it is not deemed necessary to recolonize the area where the parasites are known to exist, a limited amount of time has been given to studying more closely the habits and relations of the introduced species and of our native parasites as well as native hosts. This work is showing some interesting results, but much of the data is far from complete.

In closing, I would like to express my pleasure at the cordial and satisfactory relations that have already existed between the work which is being carried on at Melrose and that which is under the direction of Dr. Hewitt. A hearty spirit of co-operation has existed among the men connected with the work and most satisfactory results are being secured.

Mr. Gibson: I would like to ask Mr. Burgess what the total number of food plants now is upon which the Gipsy Moth feeds?

Mr. Burgess: I cannot say just at the present moment but there are a large number.

Mr. Treherne: We took some specimens of Gipsy Moth from Japan a few years ago. Has a study been made of the parasites of this insect there?

Mr. Burgess: There has been some work done in Japan on the Gipsy Moth. Professor Kincaid from the University of Washington made a trip to Japan for the Department some years ago and studied the Gipsy Moth to a limited extent while making collections of parasites for shipment to this country. As far as I know, that is the only study by an American that has been made of the Gipsy Moth of Japan. I should consider that it would be dangerous to import the eggs of the Gipsy Moth into any uninfested section of this country.

Mr. Winn: If there are no more discussions on the Brown-tail and Gipsy Moths I will now ask Mr. Gibson for his paper on "Locust Control Work with Poisoned Baits in Eastern Canada in 1915."

LOCUST CONTROL WORK WITH POISONED BAITS IN EASTERN CANADA IN 1915.

Arthur Gibson, Chief Assistant Entomologist, In Charge of Field Crop Insect Investigations, Department of Agriculture, Ottawa.

At the meeting of the Society held in Toronto in November, 1914, I gave an account of our experiments at Bowesville, Ont., with poisoned bran baits to control locusts.* Such work we considered very encouraging. During the present year, 1915, the Lesser Migratory Locust, *Melanoplus atlanis* Riley, was again enormously abundant in Ontario and Quebec Provinces and to a lesser extent the Pellucid Locust, *Camnula pellucida* Scudd. We were, therefore, able to conduct further experiments and to demonstrate the value of new poisoned baits which had not previously, under field conditions, been used in Canada.

Poisoned Baits Used in 1915.

In June last (1915) arrangements were made to conduct twenty-three experiments with various poisoned baits near Bowesville, Ont. Each experiment was on five acres and the land chosen was from adjacent farms upon which the Lesser Migratory Locust was exceedingly numerous. No poisoned bait had previously been used on any of this land. In addition to bran, shorts and sawdust were also used as carriers for the poison. Formulæ containing bran were easily mixed; shorts did not mix satisfactorily owing to the fact that it becomes sticky and lumpy which, of course, makes it more difficult to spread properly. Sawdust, if fairly well free of small pieces of wood, spreads easily, but in mixing the formulæ containing it care had to be taken to add the water slowly, as the sawdust does not absorb liquid as quickly as bran, otherwise the Paris green is liable to be washed off. In many districts where it is difficult to obtain bran sawdust may often be had for practically nothing.

The following table gives concisely the results of some of our experiments conducted at Bowesville:

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*See Rep. Ent. Soc. Ont., 1914 (1915), pp. 97-100.

	Mixture	Crop (5 acres)	Weather	Infestation	Death counts per square yard, 10 made in each field, 4 days after application, beginning at one corner of the field and walking diagonally across to the opposite corner.				Cost of single application per acre including labour	Date of application
						Highest	Lowest	Average		
1	Bran, 20 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Lemons, 3 Water, 2½ gals.	Millet, 6 in. high	warm and dry	Very heavy. Locusts in all stages. Some winged	75, 10, 7, 575, 10, 40, 100, 241, 70, 90	575	7	121.8	18½ cents	June 24
2	Bran, 20 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Pasture	warm and dry	Heavy. Locusts very active. Some beginning to migrate	155, 250, 163, 241, 54, 50, 65, 140, 200, 710	710	50	202.8	19 cents	June 29
3	Bran, 20 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Lemons, 3 Water, 2¾ gals.	Oats, 9 in. high	warm and dry	Very heavy. Locusts active. Medium number of winged individuals	26, 736, 38, 300, 36, 50, 230, 100, 300, 25	736	25	184.1	21 cents	June 25
4	Bran, 20 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Oats, 9 in. high	warm and dry	Very heavy. Locusts active	819, 691, 84, 630, 121, 918, 63, 80, 540, 120	918	63	406.6	21⅕ cents	June 28
5	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, ½ lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Pasture	warm and dry	Heavy. Locusts from very small to winged state	127, 100, 15, 40, 360, 35, 30, 25, 100, 200	360	15	103.2	16½ cents	June 24

	Mixture	Crop (5 acres)	Weather	Infestation	Death counts per square yard, 10 made in each field, 4 days after application, beginning at one corner of the field and walking diagonally across to the opposite corner.				Cost of single application per acre including labour	Date of application
						Highest	Lowest	Average		
6	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Lemons, 3 Water, 3 gals.	Oats, 6 in. to 9 in. high	warm and dry	Heavy. Locusts in various stages. Some winged	25, 400, 530, 44, 80, 60, 125, 90, 23, 15	530	15	139.2	18½ cents	June 25
7	Bran, 10 lbs. Sawdust, 10 lbs. Paris Green, 1 lb. Molasses, 2 qrts. Oranges, 3 Water, 2½ gals.	Oats, 6 in. to 9 in. high	warm and dry	Heavy infestation. Locusts active.	118, 116, 197, 33, 70, 258, 204, 200, 190, 104	258	33	149	19 cents	June 25
8	Sawdust, 20 lbs. Paris Green, ½ lb. Salt. ¼ lb. Water, 3 gals.	Oats, 9 in. to 12 in. high	warm and dry	Heavy. Locusts active. Many winged from adjacent uncultivated land	30, 121, 404, 46, 720, 650, 100, 35, 80, 100	720	30	228.6	7 cents	June 25
9	Bran, 20 lbs. Paris Green, 1⅙ lbs. Molasses, 4½ qrts. Water, 2 gals.	Oats, 9 in. to 12 in. high	warm and dry	Heavy. Locusts active.	246, 840, 509, 473, 210, 368, 230, 1,200, 616, 450	1,200	210	514.2	27 cents	June 30

From the above table it will be seen that in fields where mixtures Nos. 2 and 4 containing oranges were used, higher death counts per square yard were obtained. The mixtures in which sawdust was used are, indeed, very promising and further work with these mixtures will be conducted. The results obtained with mixture No. 8 are certainly remarkable and indicate the value of this new and very cheap poisoned bait. In the report of the Society for 1914,* Mr. Norman Criddle stated that he had experimented with sawdust and salt in Manitoba and claimed that with the salt and sawdust he obtained about the same results as with salt and bran. In the experiments tabulated above the highest death rate was obtained, as will be seen, in the use of mixture No. 9, which killed, on an average, 514 locusts per square yard of field.

As above mentioned each mixture treated an area of five acres. In the sawdust mixtures the amount of water necessary, of course, will vary with the dryness or otherwise of the material at hand. Two gallons may be sufficient, or more may be required. The carrier, whether this be sawdust or bran, should be noticeably moistened, not made into a mash, or moistened too much to prevent its being crumbled through the fingers. The farmers in general on whose lands the experiments were conducted were much pleased with the success of the mixtures. Those on whose fields mixtures 3, 4 and 8 were used have specially reported that the crops were saved by the treatment. In all of these experiments only the one application was made. The work of spreading the mixtures and making the death counts was satisfactorily accomplished by Mr. T. Rankin, a student assistant.

At Lanoraie, in Quebec Province, a series of similar experiments were conducted under my direction by Messrs. Beaulieu and Beaulne, officers of the Entomological Branch. Unfortunately, the work here was seriously interfered with by exceptional heavy and continuous rain and wind storms. In heavily infested fields where mixtures similar to Nos. 1, 2, 3 and 4, but with shorts instead of bran, the locusts were much reduced in numbers by the application, but the heavy rains which followed soon after the mixtures were spread made it impossible to make important observations as to the death counts. On June 17, mixture No. 6, as above, was spread in a field of oats. Five days later three counts only were made owing to a misunderstanding and these gave 300, 305 and 328 dead to the square yard. A heavy rain and wind storm took place between 3 p.m. and 9 p.m. on June 17, and undoubtedly many locusts which had fed on the mixture in the early morning were poisoned and later washed away by the deluge. On June 28, mixture No. 1 distributed over a pasture field resulted in an average of 129 dead locusts to the square yard. Sixteen counts were made across the field and on the date mentioned many of the insects were in the winged condition. On June 25 I visited Lanoraie and in a field of rye in which mixture No. 3 with shorts used instead of bran large numbers of dead insects were observed. The following counts in different parts of the field were made, 220, 635, 408, 235, 195, 523, 609, 395, 259, an average of 386 dead to the square yard. Dead locusts were found in numbers as far as 249 feet from the treated field.

ORGANIZATION AND CO-OPERATION NECESSARY TO CONTROL LOCUSTS OVER WIDESPREAD AREAS.

In 1915 the value of early organization to control serious outbreaks of locusts was strikingly illustrated in the Province of Quebec. In the Parish of St. Etienne de Gres where our Entomological Circular No. 5 had been freely distributed, and where control work had been conducted in 1914, the farmers organized under the immediate direction of Father J. I. Trudel, the resident Parish Priest and Agricultural Missionary. In this parish, practically all farm land—estimated at over 21,000 acres—was treated with mixture No. 1, using Paris green, however, in the strength of 1½ pounds for each 20 pounds of bran. The bran, Paris green, molasses and lemons were purchased in large quantities at wholesale rates, and the mixture distributed over the land during the week beginning June 4, at which time the locusts were from one-quarter to one-half an inch in length. Counts made a few days after the application in various fields ranged from 80 to 120 dead locusts to the square foot. I visited St. Etienne de Gres on June 23 and examined many of the treated fields. Comparatively few living locusts could be seen and the farmers generally were much pleased with the effectiveness of the mixture. Father Trudel estimated that 90 per cent. of the locusts had been killed. Of the area treated about 7,000 acres were in oats. These crops, as well as fields of other grains and vegetables, were saved from destruction. According to the Parish Priest, not a single field was devastated and the pasture lands in addition were protected from injury. The cost of the application at St. Etienne de Gres was 15 cents an acre, exclusive of labor.

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*Rep. Ent. Soc. Ont., 1914, p. 102.

Oat field at St. Etienne de Gres., Que., saved by one application of poisoned bait. (Original.)

Following the advice given in our Entomological Circular No. 5, similar work was carried on in 1915 in the following additional parishes of the Province of Quebec: Mont Carmel, Pointe du Lac, St. Boniface de Shawinigan, and Almaville. The Quebec Department of Agriculture, I am informed by Mr. J. A. Grenier, Provincial Deputy Minister of Agriculture, made the following grants to assist the farmers in the purchase of bran, Paris green, etc.:

St. Etienne	$1,013 00
Mont Carmel	675 00
Pointe du lac	200 00
St. Boniface de Shawinigan	100 00
Almaville	100 00

I have already referred to the results obtained in the Parish of St. Étienne. In the Parish of Mont Carmel the farmers, under the guidance of Father E. Fusey, treated 7,400 acres, of which 2,000 acres consisted of farm land which had been abandoned owing to the continuous outbreaks of the locusts. In some fields, in 1915, crops of vegetables and grain were harvested for the first time in eleven years. The Parish priest reported complete success in the use of mixture No. 1, with Paris green used in the strength of 1½ pounds to the 20 pounds of bran, in his opinion 95 per cent. of the locusts having been killed. On June 22, I visited the parish and very few living locusts, indeed, were present in the fields examined. Mr. G. Beaulieu, Field Officer of the Branch, who was also present in the same district during the period June 20 to 29, could not find any fields sufficiently infested to enable him to undertake control experiments similar to those conducted at Bowesville, Ont. In some fields a second treatment was given owing to very heavy rains following the first spreading.

Part of abandoned farm, Valmont, Que., now a breeding ground for locusts. (Original.)

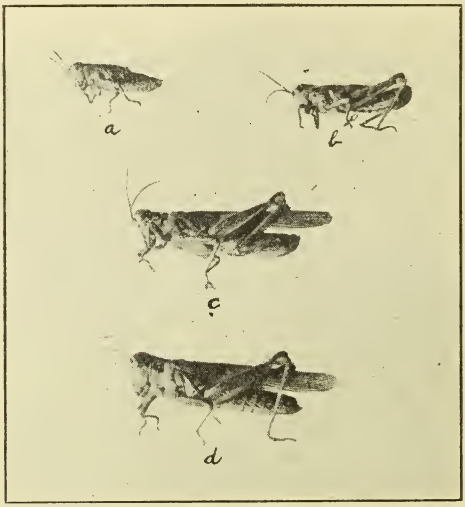
In the Parishes of Pointe du Lac, St. Boniface de Shawinigan and Almaville, similar satisfactory results were obtained and the farmers generally were well pleased with the poisoned bait, which certainly saved from destruction many fields of crops.

The question of the control of locusts is a very important one to many farmers in Eastern Canada, but we are extremely hopeful as a result of our experimental and field demonstration work, that the destruction of these insects in future outbreaks will be a comparatively simple matter—largely one of proper co-operation. Farmers living in districts where locusts are destructive should organize in early spring so that a sufficient quantity of poison, etc., will be readily available to distribute over the fields when the locusts are about the size shown at *a* and *b* of figure herewith of the Lesser Migratory Locust. The poisoned bait should be applied early in the morning (before or very soon after sunrise) on or about the same day. Twenty pounds of poisoned bait is sufficient to treat five acres. It is, of course, not necessary that the mixture be applied to all of the land, but by scattering it thinly here and there throughout the fields sufficient of the bait will be distributed to attract the locusts from considerable distances. In the preparation of the bait it is wise to guard against the breathing of the fine particles of the Paris green. This may be avoided by tying a handkerchief, loosely, over the mouth and nose.

Dr. Fernald: I would like to ask if there were any experiments made as to the variation in number of the oranges and lemons.

Mr. Gibson: In every case we used only the three fruits to the 20 pounds of carrier.

Mr. Treherne: In British Columbia we have a lot of range land. Last year we had about 100 square miles destroyed by the Migratory Locust, *M. affinis*. I would like to hear from Mr. C. P. Lounsbury on this.



Lesser Migratory Locust, *Melanoplus atlanis: a, b*, young hoppers; *c*, adult male; *d*, adult female. (Author's illustration.)

Mr. Lounsbury: Our South African matters are so very different that I am afraid there would be very little advantage in my discussing them. All our work in South Africa for many years has been done with poisoned baits or spraying. We use arsenite of soda more than Paris green because it is cheaper.

We have never attained anything with the citrus fruits. Does the fruit juice add much to the attractiveness of the bait?

Mr. Gibson: The fruit juice is, of course, supposed to add to the attractiveness of the bait. We have never had any definite experiments to bear out this fact. In the case of the new sawdust mixture containing salt alone, the salt is undoubtedly the attractant.

Mr. Winn: If there are no further discussions on Mr. Gibson's paper I will call on Professor Caesar to give his paper on " Apple Leaf-rollers in Ontario."

LEAF-ROLLERS ATTACKING APPLES.

L. Caesar, Ontario Agricultural College, Guelph.

On the discovery last year that in at least two well-cared-for commercial orchards much loss had been done by the Fruit-tree Leaf-roller* [*Tortrix* (*Cacœcia*) *argyrospila*], which has the last few years become a very troublesome pest in many parts of the United States, it seemed to me wise to study the habits and life-history of this insect in Ontario so that I might be in a position from actual experience to advise as to the best methods of control in case the insect should increase in numbers and attack more orchards. In this and other investigation work I had the assistance of my colleague, Mr. G. J. Spencer, for a few weeks, and of Mr. H. G. Crawford, a recent graduate, for the whole season. The investigations were conducted chiefly in the large apple orchard of Mr. Jas. E. Johnson, Simcoe, Norfolk County.

Species of Leaf-rollers Found in the Orchard.

We expected to find two species of Leaf-rollers [*Tortrix* (*Cacœcia*) *argyrospila*] and the Oblique-banded Leaf-roller [*Tortrix* (*Cacœcia*) *rosaceana*]. I knew, however, from the large number of unidentified egg masses on the trees that there was another insect present, but what it was I had no idea. Later on we found that it too, was a leaf-roller, which proved to be *Tortrix* (*Cacœcia*) *semiferana,* the Box-Elder (Manitoba Maple) Leaf-roller. We thus had three species working side by side.

A very peculiar circumstance in connection with our work was that though there were about 60 acres of large apple trees in one solid block, the three most important pests studied, the Fruit-tree Leaf-roller, the Box-Elder Leaf-roller and the Capsid (*Neurocolpus nubilus*) were all found together towards the centre of this orchard on a block of Spy trees of 6 to 10 acres in extent. Bordering rows of Baldwin trees were also attacked but those some distance removed, as also distant Spy and Greening trees, were very little injured. The explanation of this localization of insects is hard to discover. This part of the orchard had been in sod longer than the other parts but that scarcely seems sufficient explanation. Prof. Gillette has remarked upon the tendency of the Box-Elder Leaf-roller to appear at the same time and in the same neighborhood, but not on the same kinds of trees as the Fruit-tree Leaf-roller. It is well known that the latter very commonly centres itself in one locality injuring perhaps a single orchard severely and scarcely attacking at all another a few rods away.

Relative Abundance of Each Species.

Though the egg masses of *semiferana* were almost as abundant as those of *argyrospila* the larvæ of the latter were many times more numerous, at any rate towards the end of the season. This may have been due to the former species being less immune to poisonous sprays (Lugger of Minnesota reported that Paris green controlled this species) or to some other unknown cause. *Rosaceana* was not nearly so abundant even as *semiferana.* About nine-tenths of the total injury was done by *argyrospila.*

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*Mr. August Busck states that the generic name "Archips" has been dropped and "Cacoecia" is tentatively retained as a subdivision of Tortrix.

DISTRIBUTION IN THE PROVINCE.

Argyrospila is so common and so widely distributed all over the United States that it is not at all surprising to find that it exists almost, if not quite, all through the fruit districts of Ontario. I have either captured or reared adults from places here and there all the way from Ottawa to Norfolk County and feel sure I could, with a little searching, find them in almost all other fruit counties. This clearly indicates that it is by no means a new pest, but that through some peculiar absence of natural means of control has the last two or three years suddenly become a very destructive one in a few orchards and may yet become so in others.

Rosaceana was until the last couple of years considered our most common and destructive apple leaf-roller. It is seldom present, however, in large numbers. It, too, has existed all over the Province for many years.

Semiferana is very little known in Ontario. There is one specimen in the collection of the Ontario Entomological Society, but without any data as to where and when it was taken. A specimen was taken by Dr. Fyles at Levis, Quebec, and one is reported as being in Mr. Winn's collection, but he has no recollection of having seen or taken any. There is no record of it from Nova Scotia. In Ontario, Mr. Crawford and I have searched in several localities this fall for egg masses, but found none outside of the orchard at Simcoe. It is very probable, however, that a careful search of forests would show its presence in quite a number of localities, otherwise it is difficult to account for its abundance at Simcoe.

HOST PLANTS.

At Simcoe we found the Fruit-tree Leaf-roller (*argyrospila*) preferred apple trees to any other kinds. A few were observed on pears, plums and peaches, and also on oaks. In the orchard it was seen that the larvæ fed freely upon almost any kind of succulent or moderately succulent weed beneath the trees. They were very fond, too, of the leaves and heads of clover and of vetch in such positions. A study of the literature on the subject shows that it has a very large number of food plants, including numerous weeds, forest and shade trees, and shrubs. So that it is by no means limited to fruit trees.

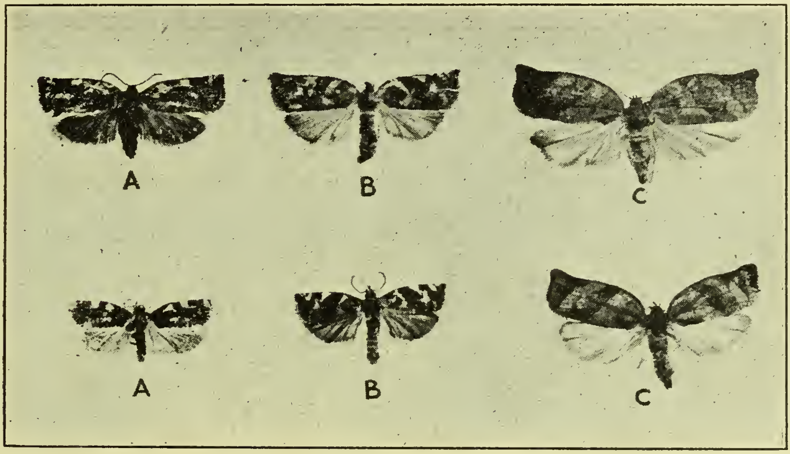
The Oblique-banded Leaf-roller (*rosaceana*) is found most commonly on apples and pears but from the list of host plants given by Slingerland and Crosby, which include several weeds and clovers, it must be almost as omnivorous as the Fruit-tree Leaf-roller.

The Box-elder Leaf-roller (*semiferana*) has never before, so far as I can find, been reported as attacking apples. A few wild cherries and currants beside Box-elders have been found by Lugger slightly infested. Its favorite food, however, is the Box-elder, often called the Manitoba Maple. In Colorado and Minnesota it has been reported as occurring at times in great numbers on these trees. It is recorded also from oaks and hickory.

NATURE AND EXTENT OF THE INJURY DONE.

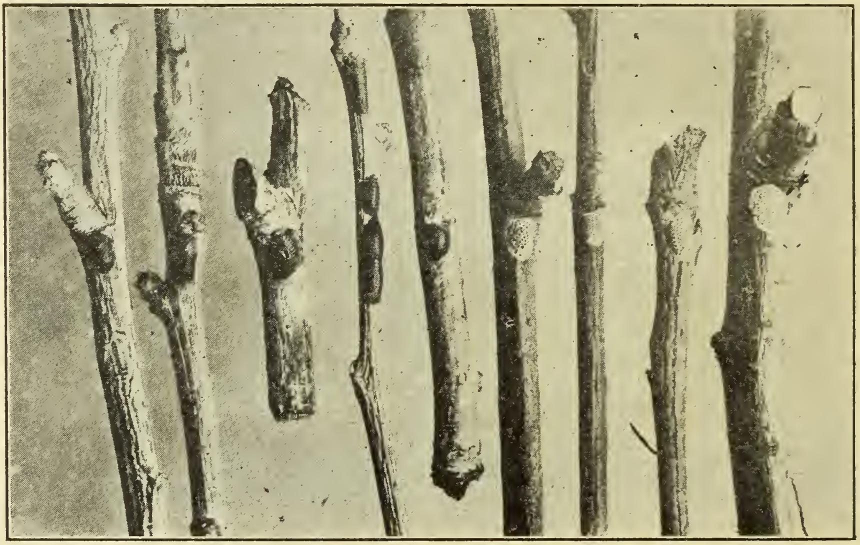
So far as we could see from a single season's work, the feeding habits and injuries done in the orchard by all three species were so similar that a description of what was closely observed in the case of the Fruit-tree Leaf-roller will serve for all.

We were not able to begin our work until May 3rd and by this time the majority of the larvæ had hatched and entered the opening leaflets of the infested Spy trees and were feeding on the interior. The larvæ had apparently begun to hatch, as stated by various writers on the subject, soon after the buds began to burst. By May 3rd, the leaflets were about one inch long but the blossoms were not yet ready to burst. Leaflets containing a larva inside were prevented by the silken threads from opening for some time. Later-hatching larvæ rolled the expanded leaves up, either the whole leaf being folded or only a portion of one side. When the fruit buds were ready to burst these were in many cases preferred to the leaves and the larvæ bored into them and fed upon the stamens, pistils or ovaries, thus destroying the promise of fruit. Sometimes, as the cluster of blossom buds opened, a silken web was spun around these and perhaps an adjoining leaf or two, and the larvæ fed on the parts inside the web. Under these circumstances the blossom stems were often cut off. When that was not done, the blossoms themselves were usually unable to open properly because of the web. When the fruit began to form many of the caterpillars deserted the leaves for this and ate large or small areas in it. Sometimes the areas were only shallow, but sometimes they extended right through to the core. In the case of plums they often reached right into the pit. Almost all apples with very deep injuries dropped soon. The others, if they remained on the tree, were always more or less deformed and as a rule rendered culls. A callous growth with russet surface soon formed over the injured area and protected it from the air and rain. Feeding on small apples was usually done under some kind of protection, such as a leaf fastened by the larva to the apple or a little web spun over the hole made. When the larvæ fed upon the large expanded leaves they nearly always chose those last formed and therefore most succulent. These they rolled either upwards or downwards, about 66 per cent. being rolled up so that the upper surface was the enclosed one, the remainder being rolled the opposite way. Migration from older leaves to younger seemed to be quite common and helped to explain the difficulty of killing the larvæ by arsenicals. The larvæ, when in the large rolled leaves, fed either by eating holes through the leaves or by devouring the apical or basal portions, leaving the rest intact. When disturbed they readily dropped down by a single thread and usually crawled back to the leaf when all was quiet.



Adults of (*a*) *Archips agryrospila;* (*b*) *A. semiferana;* (*c*) *A. rosaceana.*
(All natural size.)

Where the larvæ were very abundant they did a great deal of damage both to the foliage and the fruit. Large numbers of the terminal leaves in such cases, especially on the top of the tree, were badly tattered and riddled by them, but none of the trees were defoliated as had happened in some cases in Colorado and elsewhere. In the orchard at Simcoe there was so light a setting of fruit on most of the Spy trees this year that it was difficult to form any estimate of the amount of loss. On one well-laden tree, however, of another variety in among the Spy trees fully 50 per cent. of the fruit was ruined either by the destruction of the fruit blossoms or by the killing of the young fruits themselves or by rendering much of what remained culls. In an orchard near Hamilton I estimated that some large Greening trees had fully 50 per cent. of the crop destroyed. Mr. Sexsmith of Trenton estimated that in his ten or twelve acre orchard the crop had been lessened fully 50 per cent. in the infested orchard both last year and this. Another orchard of his, and all the neighboring orchards visited by me, had suffered almost no injury. In Norfolk County we found only the one orchard at all seriously infested, though a few larvæ were to be found all through the district.



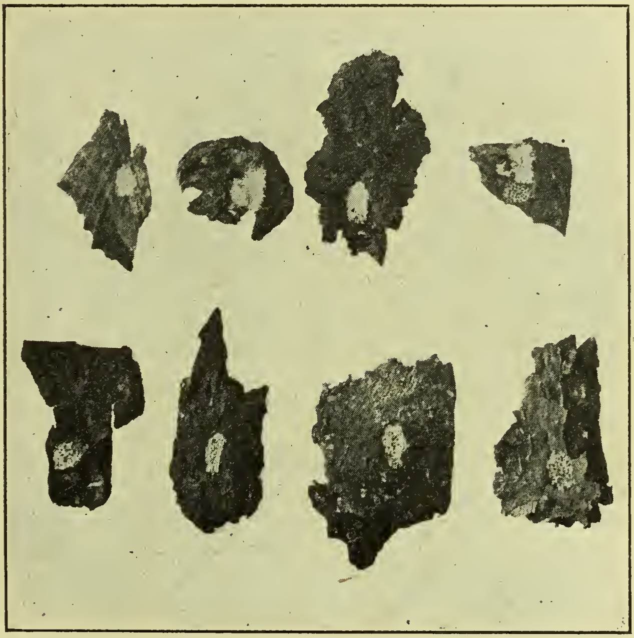
Egg masses of *A. argyrospila*. The four to the right have hatched. and are white; the remainder are unhatched and are dark brown. (Natural size.)

An examination of the only three badly infested orchards known to me showed that any variety of apple was subject to attack and that there was no reason to believe that there was any special attractiveness in the Spy over other varieties.

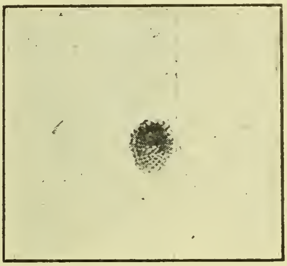
Brief Descriptions of the Adults of Each Species.

The adult of the Fruit-tree Leaf-roller is a moth with a wing expanse of from two-thirds of an inch to one inch. The general colour of the fore wings is a rusty brown with several silvery-white or silvery-gray markings which vary somewhat in different individuals, but are usually of the size and arrangement shown in the photograph. The hind wings are a light ashy brown color without any markings.

The Box-elder Leaf-roller adult resembles very closely in shape, size and whitish markings, the above species. It differs, however, from it in that the general color of the forewings is a much lighter brown, almost a fawn color. The hind wings in the former species contrasted strongly in colour with the fore wings but in this species they are practically the same pale brown or fawn color only a little lighter in shade. Moreover, the white markings, as seen in the photograph, usually continue farther in from the front margin forming in the case of two of them irregular oblique transverse bands reaching most of the way across the wing. In many males there is a noticeable dark brown spot, the size of the head of a pin, enclosed or nearly enclosed by white areas and situated in the middle of the front wing at about the outer part of the first third. There are some very light colored specimens in which the white markings are very indistinct.



Egg masses of *A. semiferana* on pieces of apple bark. Those in the upper row, with one exception, are unhatched; the remainder have hatched. (Natural size.)

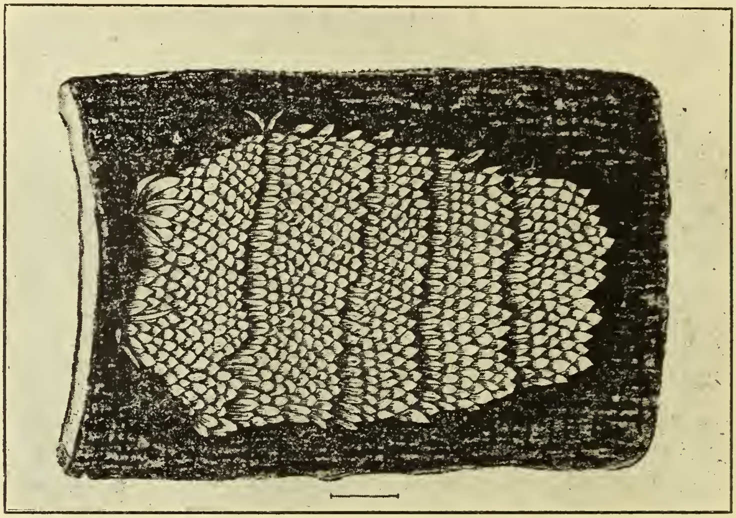


Egg masses of *A. rosaceana*, laid on glass. The little line to the side is a young larva just emerged from an egg. (Natural size.)

The adult of the Oblique-banded Leaf-roller is, as seen in the photograph, considerably larger than either of the above species though many specimens are smaller than those pictured. It can easily be distinguished from either species by the absence of white markings and by the front wings being a dull light brown with two wide darker brown transverse bands on the outer half running obliquely outwards from the front margin. The outer of these bands is sometimes incomplete. The hind wings are of a lighter brown than the front. There are some very pale specimens of this species, too, compared with the typical forms.

DESCRIPTION OF EGG MASSES OF THE DIFFERENT SPECIES.

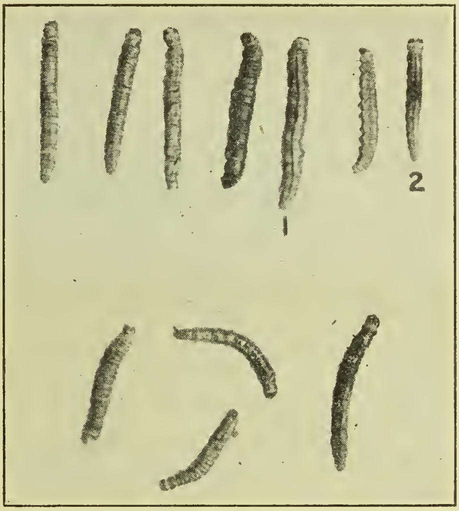
All three species lay their eggs in clusters as seen in the photographs. The egg masses of the Fruit-tree Leaf-roller are roughly oval in shape, about three-sixteenths of an inch in length, and are covered with a protective secretion. They are, with very rare exceptions, laid on twigs of two or three years' growth, and commonly on some slight slope on these such as occurs at the base of a branch or fruit spur. They are nearly always deposited on the upper surface or sides of the twig, only two or three having been found on the underside. Freshly laid masses are yellowish green but soon turn dark brown, a little darker brown than the twigs on which they are laid. After hatching they gradually become grayish white and are then more easily seen. The little openings show where the caterpillars emerged. Old egg masses sometimes remain on the trees for two years before weathering away. Each egg mass contains an average of about 95 eggs, the smallest number found being 6 and the largest 143.



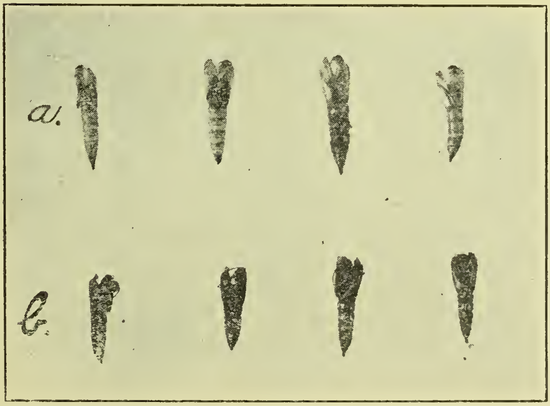
Egg masses of *A. semiferana* much enlarged to show the scales from the moth's abdomen that form the covering. (After Gillette.)

The egg masses of the Box-elder Leaf-roller are easily distinguished from any other egg mass likely to be found in that they are covered over with scales. We have not observed the female laying the eggs, but there seems no doubt that after she has deposited and covered them over with a sticky secretion she presses her abdomen down upon this secretion and leaves all the scales there arranged as in nature. This would lead us to infer that only one egg mass is laid by each female. The masses are, as seen in the figure, roughly oval, are a little smaller than those of the Fruit-tree Leaf-roller and are glossy cream in color. They usually appear to contain from 20 to 60 eggs. Unlike those of the first species the egg masses are not laid on twigs but chiefly in the axils of branches of from about one to two inches in diameter, and on the bark of the larger branches of 1½ inches and upwards in thickness. A few are found on the trunk. The eggs are usually placed in a slight depression on the bark.

Only four egg masses of the Oblique-banded Leaf-roller were seen. Two of these were laid on the glass in rearing cages (one of these is shown in the photograph) one on a leaf in the orchard and another on the bark of a young apple tree. The mass is pale green before hatching and then becomes transparent and almost colorless. The eggs lap one over the other somewhat as shingles. The mass is a little larger than that of the Fruit-tree Leaf-roller and contains an average of about 100 eggs. When ready to hatch, as in the photograph, the black heads of the little larvæ show through the mass very distinctly and make it easy to count the eggs.



Full-grown larvae: 1 and 2 of *A. semiferana*, the remainder of *A. argyrospila*. (Natural size.)



Empty pupal cases (*a*) of *A. semiferana*, (*b*) of *A. argyrospila*. Note that the former are very much lighter in colour, often being nearly white. (Natural size.)

COMPARISON OF THE LARVÆ.

The larvæ of all three species closely resemble each other both in appearance and habits, and therefore will not be distinguished by the fruit growers. In the early part of the season up to the time when the fruit begins to be attacked the larva of the Oblique-banded species will nearly always be the largest of the three because it reaches maturity earliest. It is, when full grown, nearly an inch long, green in color, with a black or blackish head and thoracic shield.

The full grown larva of the Fruit-tree Leaf-roller is usually more of a pale yellowish-green color; it also has a black head and thoracic shield in all stages except the last when these usually change to brown.

The full grown Box-elder larva is like the above two in being nearly an inch long. It is a very pale apple green color and can be distinguished from either of the above species by the head and thoracic shield being a whitish green instead of black. There is often a slight mottling of brown on these parts, and in some specimens at least, the segments are indistinctly divided by pale yellowish-white lines. There is a dark green line down the middle of the back.

COMPARISON OF THE PUPÆ.

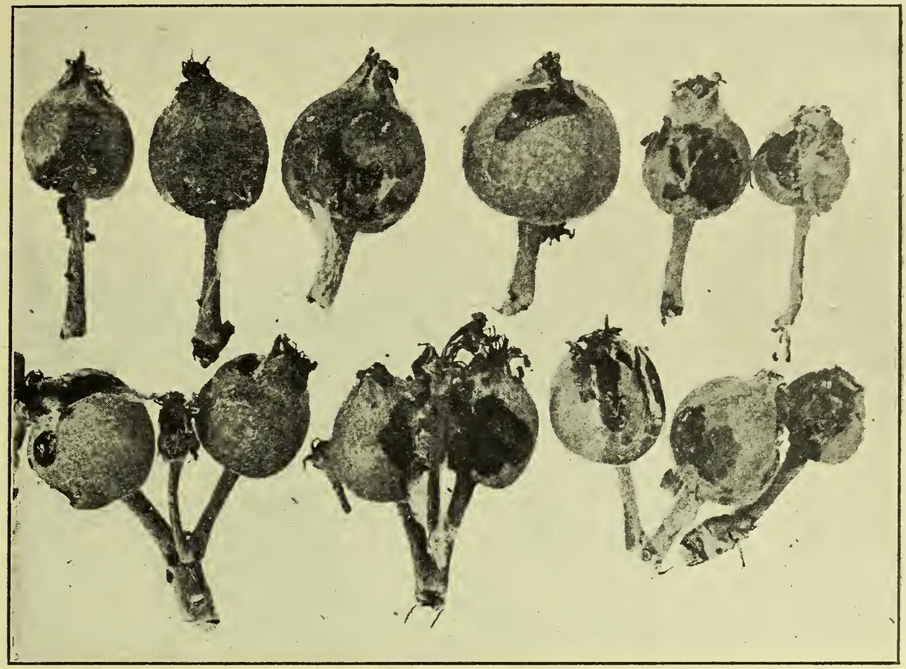
It does not seem worth while to go into details in regard to the differences between the pupæ, further than to remark that those of the Fruit-tree Leaf-roller and of the Oblique-banded species are brown, whereas those of the Box-elder species are whitish both before and after the adults emerge.

LIFE-HISTORIES.

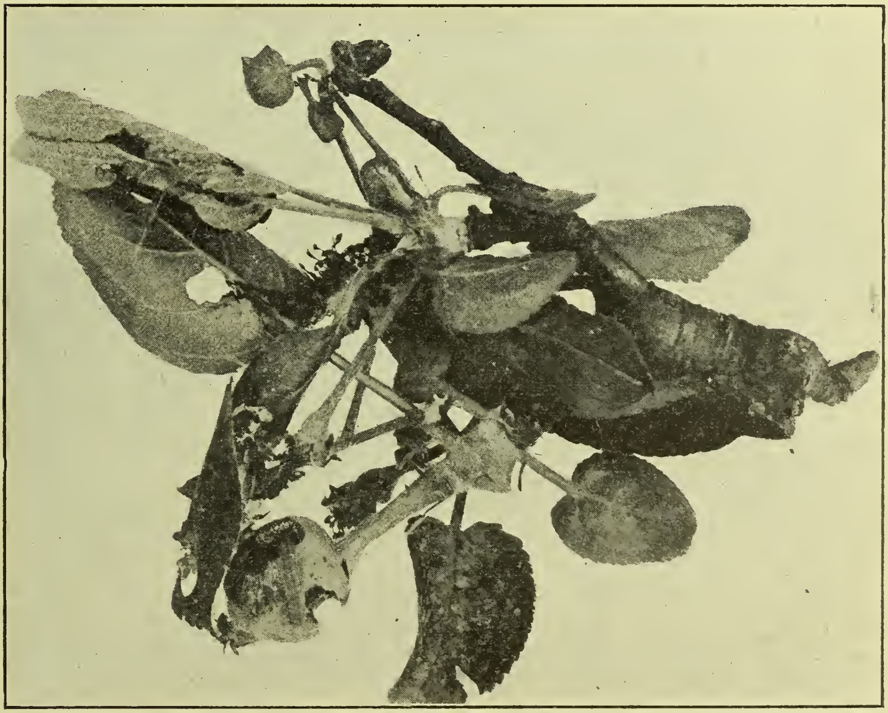
The winter is passed by all the species in the egg stage on the trees. We did not prove this of the Oblique-banded species because the larvæ of the second brood of this species all died in the cages, but Herrick, of Cornell, has shown that eggs are laid by the second brood adults and the winter passed in that stage. The eggs of all three begin to hatch near the same time, which is usually very soon after the buds are beginning to burst. Almost all those of the Box-elder Leaf-roller and also of the majority of the Fruit-tree Leaf-roller had hatched by May 3, which was a few days before the blossoms on the Spy began to burst. At this date the larvæ of these two species were still very small, being only about ⅛ inch long. Hatching of *argyrospila* eggs continued for a month, the last newly hatched larva being seen June 8th.

By May 25th the Oblique-banded Leaf-roller had begun to pupate and by June 10 the first adult was seen. The latter date was about two weeks after the blossoms fell from the Spy trees. The pupal stage of this species, judged from the few specimens reared, lasted about 13 days. The larvæ of the Fruit-tree Leaf-roller began to pupate about June 14, but larvæ were present for three weeks or more later. Adults were first seen in the orchard on June 26th. After this they soon became quite common. By July 12 they seemed to have reached the maximum, and then quickly decreased in number, the last being seen on July 22. The length of the pupal stage averaged 11.5 days. Adults in cages lived only five or six days.

The first pupa of the Box-elder species was found on June 26th, but there must have been pupæ earlier than this for adults were found on July 3rd, and cage experiments showed that the pupal stage lasted about 12 days on an average.



Young apples injured by Leaf-roller larvae. (Natural size.)

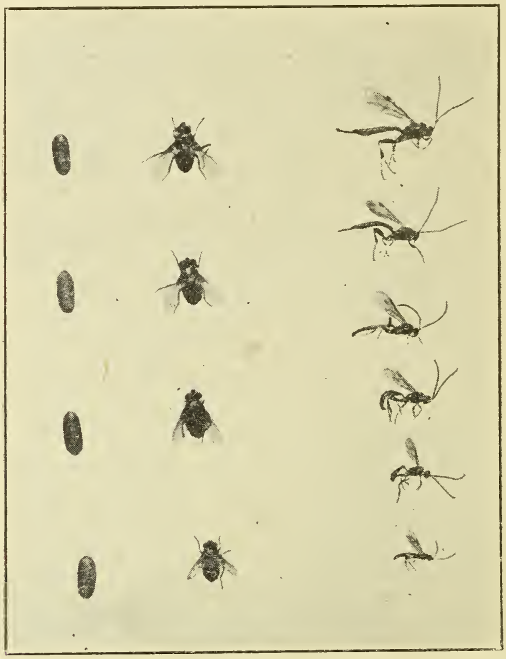


Work of Leaf-rollers on leaves and fruit clusters. Note the rolled leaves and the young dead fruit stems fastened to them. (Natural size.)

From July 3rd they increased rapidly and were still abundant July 20th, but soon after disappeared. They were seen, however, a week or more later in the orchard than the preceding species.

The above data shows that this year *T. rosaceana* adults began to emerge about two weeks earlier than those of *T. argyrospila* and the latter about a week earlier than those of *T. semiferana.*

Rosaceana and *semiferana* seemed to pupate almost invariably in the leaves, but much to our surprise fully half of the pupation of *argyrospila* either took place on weeds or in the grass or else the pupæ were shaken by the wind out of the leaves into the grass beneath. For instance, we spread a covering of cheesecloth, 8 x 10 ft. in size, on the ground beneath a tree on June 26th after emergence had begun and under this 320 pupæ or empty pupal cases were found and upon it 84 pupæ, making a total of more than 400 which we estimated was a larger number than the total of the pupæ on the corresponding part of the tree above the sheet. There was no lack of food on the trees to force them to descend and very few weeds other than withered blue grass. Wherever there were succulent weeds under infected trees many larvæ fed and pupated in these.



Some of the parasites that help to control Leaf-rollers. On the left are Tachina Flies and their puparia; on the right Ichneumons.

None of the species of moth fly around in the day, unless disturbed, and then with a rapid zigzag motion they fly down into the grass to hide. Owing to the distance (2½ miles) of the orchard from our boarding places and the fact that the moths did not lay during the day time so far as we could tell, we did not see any of them ovipositing but know that the eggs outside are laid within a few days after the emergence of the adult, just as they are in the cages.

There is clearly only one brood a year of the Fruit-tree Leaf-roller and of the Box-elder Leaf-roller respectively, but there are two broods of the Oblique-banded species. The eggs of this last species, laid in the cages, began to hatch in seven days after they were laid. The young larvæ once they began to emerge out of the mass did so in a very short period and were seen to be very active from the moment of emergence. They were placed upon succulent shoots at the base of a tree and caged in but for some unknown reason died before reaching maturity.

NATURAL ENEMIES.

1. Spiders, ants, syrphid-fly larvæ and pentatomids each destroyed some larvæ but not a large number compared with the total.

2. A number of instances were observed where very active Leaf-roller larvæ devoured their more sluggish brothers, the sluggishness being due either to disease or preparations for moulting or pupation.

3. Birds feed to some extent upon them, but there were very few birds in the Johnson orchard.

4. Disease almost all through the larval season destroyed a considerable number, especially towards the end of the season. Pupæ, too, were evidently diseased for many were found that shrivelled up and turned black. Some of these had been parasitized but many had not. The dead larvæ were not killed by spraying as they were found also on unsprayed trees.

5. Tachinid parasites were present in moderate numbers. There were two species of these: *Masicera eufitchiæ,* Townsend, and *Exorista cæsar,* Aldrich, n. sp. The latter were far the more numerous. (Dr. J. M. Aldrich kindly indentified the Tachinidæ for me.)

6. At least two and possibly three species of Ichneumons were common but we have not yet been able to get them determined.

Apparently not more than 5 per cent. of the larvæ were destroyed by parasites. They would probably have been much more abundant if the weather had been warmer. The month of June was very cold and on cold days parasites scarcely appeared at all. Disease evidently played a greater part in control than parasites.

For some reason more than half of the eggs of the first brood moths of *rosaceana* failed to hatch though the larvæ could be seen very plainly inside, but, as stated above, we found only four egg masses of this species.

METHODS OF CONTROL.

We, probably like everyone else who has examined the work of *Tortrix* (*Cacœcia*) *argyrospila,* found it hard to believe that a caterpillar that left the leaves in such an eaten, ragged condition could not be satisfactorily combated with arsenical sprays but our experience this year leads us to agree with Herrick, Childs and several others that arsenical sprays are not satisfactory. They kill a considerable number but not nearly enough to prevent great loss. There are two reasons for the failure of these poisons to be effective:—(1) While the larvæ are still small and will die if they eat the poison, their habits of feeding prevent the great majority of them from getting access to it. This is because as soon as they hatch they usually seek an opening bud or leaf just beginning to unfold itself, and work into the centre of these, feeding in the interior and therefore unpoisoned part, and retarding for a considerable time the opening. On Spy trees, at least, unfolded leaves suitable for the later hatching larvæ to hide in are present until the blossoms are wide open, and are sought by the majority of the young larvæ in preference to open leaves. The undeveloped fruit buds are also sought. (2) When the larvæ become large they seem to be very little affected by the poison. We found many well poisoned leaves being eaten and the larvæ perfectly healthy.

That the poison will kill the younger larvæ if they eat it was proved by Mr. Crawford by immersing infested twigs in various strengths of arsenate of lead in water. He used 2, 3, 4 and 5 lbs. to 40 gals. of water respectively, and killed all larvæ with each strength except those in the undeveloped leaves that were so closely folded that the liquid did not get in. It entered all loosely rolled leaves. This sort of dipping, however, is very different from the very best spraying even with power machines that can be done, especially on large trees, because the spray fails to get into many a loosely rolled leaf, or mass of blossom clusters or leaves webbed together.

Unfortunately, I was too busy conducting spraying experiments for San José Scale, Canker Worms, Codling Moth and Apple Scab in an orchard in the Niagara district to do the spraying myself at Simcoe, and Mr. Crawford was too busy watching the three Leaf-rollers and the Capsid to devote much of his time to it. Mr. Johnson, however, had a good outfit and certainly sprayed more thoroughly than most men would do. He was just as eager to kill these insects as we were. Four applications with double strength arsenate of lead (almost 4 lbs. to 40 gals. of dilute lime-sulphur) were used. The first was just as the leaflets began to appear, the second just before the blossoms opened, the third as soon as the blossoms fell, and the last two weeks later. Black-leaf-40 was used at his own desire with the last of these to destroy Aphids. The foliage showed whitish all summer long with these heavy sprayings.

Mr. Sexsmith, of Trenton, on my advice also sprayed his orchard very heavily before the blossoms opened and used double strength arsenate of lead. He also sprayed heavily for the Codling Moth. Yet in both orchards the results were very disappointing for there were numerous larvæ left and many observations in the former by Mr. Crawford and myself convinced us that only a small percentage of the larvæ had been poisoned. I intend, however, to re-test this next year and supervise all the spraying myself.

Black-Leaf-40, it is claimed by some, will control this pest if applied while they are young. Gill, of Washington Bureau, tested this but did not get so good results as from arsenate of lead alone. It certainly had no lasting effect upon the medium sized larvæ at Simcoe, though for a little while it seemed to stupify some of them. It doubtless would help in the spray just before the blossoms burst, but would not kill the larvæ in the closely folded leaves and buds. It seems to me we could not possibly hope to get satisfactory results from it even with two applications. It is, moreover, very costly.

Lime-sulphur is known to be useless against the eggs.

Miscible oils alone have given really satisfactory results to most investigators. This spray is used only against the eggs.

I sent Mr. Johnson ten gallons of Scalecide and instructed him to dilute this 1 to 5 and to spray just as the buds were ready to burst. He was told to centre his spraying on the twigs of the infested Spys and pay no attention to the bare branches and trunk. He did so and used about from 4 to 5 gals. to a tree One Baldwin tree he sprayed heavily. The result was that this tree showed approximately 80 per cent. of unhatched eggs, unsprayed trees only about 2 per cent., and the lightly sprayed Spy trees not more than from 10 to 25 per cent. The explanation, however, of the poor result is simple but very instructive.

Scalecide will not kill the eggs unless they are thoroughly wet and 4 *to 5 gallons per tree was not more than half enough to wet all the twigs on these large* 40-*year-old Spy trees.* It only allowed for a fine mist. Both he and I were afraid to risk heavy spraying with a miscible oil without further experience with it. I also observed that on large Spy trees with their tendency for upright twigs and branches the same care would be necessary to do thorough work as if one were spraying for San José Scale, otherwise numerous twigs at the farther side of a tree would have only one side of their bark wet because of the failure of the spray to reach through that far. Most reported experiments with miscible oils have been done on trees 12 to 14 years of age, but these are vastly easier to spray thoroughly than trees twice or three times their size. A strong wind would help greatly in this spraying. Also well pruned trees would be a great boon. Mr. Johnson's, however, were very well pruned.

Scalecide and another as yet unnamed miscible oil, and also Caustic Soda solution, were tested this August on egg masses, and though used very strong, have had no effect upon the eggs of either *argyrosphila* or *semiferana,* so that fall spraying appears to be useless.

Recommendations.

From the experience gained this year, we feel like recommending the following methods of control:

1. Prune trees well, thinning out the excessive branches and twigs and lowering the trees where possible. This is to make spraying easier, cheaper and more effective.

2. Spray very thoroughly with Scalecide or some other good miscible oil, just as the leaf-buds are almost ready to burst but so as to finish before they have done so. Take care to wet well the top and both sides of all the twigs. There are scarcely any eggs on the underside of twigs or on any large branch at least in Ontario.

3. Use 3 to 4 lbs. arsenate of lead to 40 gals. of dilute lime-sulphur or Bordeaux mixture in the application just before the blossoms burst, and drench the foliage, covering even the underside of the leaves.

4. Spray again heavily for Codling Moth with 3 instead of 2 lbs. arsenate of lead.

Note.—If Scalecide or other good miscible oil is considered too expensive or cannot be secured, add Black-Leaf-40 or some equally strong tobacco extract to the spray before the blossoms burst, using a little stronger than for Aphids, and using lime-sulphur, not Bordeaux, with it.

5. If the fruit grower has many chickens and can establish these in the orchard, they will destroy great numbers of larvæ and pupæ whether the orchard is cultivated or not.

6. Cultivation up to as late as safe for the district, with moderately deep discing the last time, should help to destroy many larvæ and pupæ that reach the ground or that are feeding on the weeds that may spring up from time to time. Adults from pupæ buried 2 inches deep by Mr. Crawford were found by him to be unable to emerge.

Mr. Winn: I am sure you have all enjoyed Professor Caesar's paper.

Prof. Caesar: As to dust sprays for Leaf-rollers, I should say that there is some reason to believe that the dust spray would enter better into the places where these little larvæ are concealed than the liquid spray.

Mr. Treherne: May I ask a question? Have you tested the effect of sprays like Bordeaux and lime-sulphur in relation to the oil coating on trees?

Prof. Caesar: We could not make any definite statements in this connection.

Mr. Sanders: Did you find any variation in the color of the heads of *Archips rosaceana?*

Prof. Caesar: I may say that we laboured under difficulties as at first we did not know which larvæ were which. I am not sure how much variation there was. This species was rare in the orchard.

Mr. Petch: In regard to this new pest in the Province of Quebec for three years out of the last four we have not had them at all. Last year they appeared and attacked 75 per cent. of the fruit in some orchards; this year in the very same orchards after the ordinary spraying there was no injury. We have both species that were mentioned. It seems to me that this pest has, through some climatic conditions or through some assistance, come over to our fruit land and, through some other means which I do not know, disappeared. Previously I do not know that it has been recorded in the Province of Quebec as a serious pest.

Mr. Winn: I think there is some doubt as to where that species came from.

Prof. Caesar: I would like to say that there is little doubt that this insect will come under control within a few years.

Mr. Winn: There are fifteen minutes left to be devoted to questions that may be asked. The meeting is open for general discussion.

Mr. Treherne: I would like to start the discussion by asking for some information on the latest sprays, like Soluble Sulphur, Blackleaf 40, and the different kinds of oil sprays.

Mr. Sanders: We had very much experience with Soluble Sulphur this year, but we are not in a position to make any recommendations on this material, although some day we may be able to make a spray of it.

Dr. Fernald: I have had a little experience with soluble sulphur and I may say that under the conditions in which I used it it did did not prove a good poison. Some experiments made years ago and not published until after they had long been duplicated, beginning first with the analysis of the lime sulphur and determinations of the ingredients found in it, show conclusively that the results at that time under those circumstances were obtained with polysulphids and thiosulphate, and that when these reduced to sulphite we got absolutely no results whatever. I have some hope, however, for soluble sulphur, though I may have nothing whatever to base my hope on after all. It is, perhaps, among the possibilities that the Red Spider may yet prove to be more or less successfully attacked by such a substance as soluble sulphur. It is one of the things that I hope yet to carry on experiments with. I can only say, therefore, that I am hoping there is something in it, and yet I do not know.

Mr. Sanders: Did you ever have any experience with Barium sulphide.

Dr. Fernald: Yes. We tried it this year and watched the results carefully all summer on San José Scale. The results have been quite satisfactory. The same trees which a year ago last spring were treated with the lime sulphur, and this year with Barium sulphide, were on the whole in better condition than they were a year ago. That does not mean, you will realize, that the treatment was distinctly better than lime sulphur, because there might have been other factors this summer which did not appear a year ago, but if we can get anything like the same results we found it a much more convenient substance to handle. It is much more easily shipped.

Mr. Petch: I would like to say from our experience in Quebec, although small, that the use of these various spray mixtures ought to depend upon the insects which we have to control. For instance, we know that ordinary lime sulphur will largely control the Tent Caterpillar if sprayed at the proper time, and when we used a soluble sulphur we had absolutely no results at all in controlling the Tent Caterpillar. Furthermore, this year I have used arsenite of lime, one quart to forty gallons, and there has been absolutely no injury to the foliage. It was combined with Bordeaux mixture.

Mr. Sanders: The arsenite of lime we used burned the foliage very badly in almost every case.

Prof. Caesar: As for Soluble Sulphur, I may say we tested this mixture on old, badly infested apple orchards two years ago in the Niagara district and again this year, and found it gave very good satisfaction against San José Scale, just as good as lime sulphur or Scalecide. We have not tested Barium sulphide because the company could not supply us with it. We have also obtained good results from soluble sulphur as a summer spray, but found it, when used with arsenate of lead, more inclined to burn than the lime sulphur.

Arsenite of lime with lime sulphur is a decidedly dangerous spray to use. I have burned nearly every leaf off trees with it, but there are some people who still use it and get very little burning. When used with Bordeaux mixture it is usually safe. It is particularly good for spraying potatoes used along with Bordeaux.

The matter of injury from sprays to apple foliage depends to a great extent upon moisture condition. If the spray, particularly lime sulphur, dries quickly after being applied there is usually no burning, but if it remains in a liquid state on the leaves for some considerable time due to fog or rain, it may do a good deal of burning.

Mr. Sanders: I think that has been the experience all over the country this year; it has become a question of moisture.

Mr. Winn: I will ask Dr. Hewitt to make a few remarks about the smoker.

Prof. Lochhead: Before adjourning, I have much pleasure in rising to move a vote of thanks to our retiring President. I have observed him for the last three years, and during that time Dr. Hewitt has presided over our deliberations and carried the meetings through to a most successful conclusion. For the last two years he has been President by right of choice and he has brought the society to a most flourishing condition. Last year we had a most enjoyable meeting in Toronto, and this year it has been still better. I think all will agree that our proceedings have been most excellent. I would like also to include in my motion the thanks of the society to our visitors. We are very much indebted to Professor Fernald and Mr. Burgess for coming up to Canada, and we are also extremely pleased to have Mr. Lounsbury, of South Africa, with us. They are all distinguished visitors, and they have been helping us out wonderfully. I know that the society will show their appreciation in a fitting manner.

Prof. Caesar: There is not one of us here but endorses what Professor Lochhead has just said. Dr. Hewitt has certainly done wonders for the Society the last few years. Of course, behind Dr. Hewitt has been Mr. Gibson and the other members at Ottawa. It is really a great pleasure and a great source of benefit to be able in the discussions we have had to call upon those who have come from outside, and we have had a broader view of entomology and a greater amount of benefit from the presence of these men.

Mr. Gibson: I would like to move a vote of thanks to Dr. F. J. White, the Principal of the Normal School, for allowing us the use of the Assembly Hall last evening.

Mr. Tothill: In rising to second this motion I may say that this has been one of the most enjoyable meetings of this organization.

A PRELIMINARY LIST OF PARASITIC INSECTS KNOWN TO OCCUR IN CANADA.

R. C. Treherne, Field Officer, Entomological Branch, Department of Agriculture, Ottawa.

The following list of parasitic insects of some of the more common pests is presented to guide entomologists in Canada in the numbers and names of parasites recorded in Canada. This list does not claim to include all known parasitic insects recorded in Canada, but it is hoped that as times goes on it may be supplemented by additional data and become a more complete guide for reference.

In preparing this present list the following literature has been consulted:—

(1) The Reports of the Ontario Entomological Society, 1870-1914.

(2) The Reports of the Dominion Entomologist in the Experimental Farms Reports and separate Reports of the Department of Agriculture of Canada, 1884-1914.

(3) The Bulletins of the Division of Entomology and the Entomological Branch of the Dominion Department of Agriculture until the close of March, 1915.

(4) The Annual Reports of the Department of Agriculture, Ontario, 1880-1913.

(5) The various Agricultural and Entomological publications from Nova Scotia, New Brunswick, Quebec, and British Columbia, until the close of 1914.

(6) The Annual Reports of the Quebec Society for the Protection of Plants, 1909-1914.

An occasional reference is made to *The Canadian Entomologist,* but no effort has been made to include the many valuable records incorporated within the pages of this journal. This will be done on a later occasion. The same applies to the Proceedings of the United States National Museum, and other publications issued in the United States, in which many original records of parasites named from Canadian material may be found.

As a general rule I have recorded in the following list only the names of parasitic insects mentioned as definitely determined species, and further so as far as possible, only records in which the host and its parasite or parasites are clearly shown to be associated and to occur in Canada.

Alsophila pometaria Harris. The Fall Canker Worm.

APANTELES PALÆACRITÆ Ril.

Braconid.. *Report* XXIV., Ent. Soc. Ont., 1893, p. 25. Harrington, On larva. Ottawa, Ontario.

HEMITELES SESSILIS (Gmel) Grav. (? secondary).

Ichneumon. Rpt. XXIV., Ent. Soc. Ont., 1893, p. 25. Harrington. On larva. Ottawa, Ont.

Ambesa walsinghami Rag. The Hickory Leaf Roller.
  Mesostenus thoracicus Cress.
    Ichneumon. Rpt. XXIV., Ent. Soc. Ont., 1893, p. 25. Harrington. On larva. Ottawa, Ont.

Ampelophaga myron Cram. The Lesser Grape Vine Sphinx .
  Apanteles congregatus (Say) Prov.
    Braconid. Rpt. Dom. Ent., Cen. Exp. Farm, Canada, 1892, p. 161. Fletcher. Ex pupa; generally distributed over Western Ontario.

Anosia plexippus Linn. The Monarch.
  Trichogramma minutum Ril.
    Chalcid. Rpt. XXI., Ent. Soc. Ont., 1890, p. 72. Harrington, Ottawa, Ont. On egg.

Apatela hastulifera A. and S.
  Rhogas intermedius Cress.
    Braconid. Rpt. XXV., Ent. Soc. Ont., 1894, p. 55. Fyles. Ontario. On larva.

Aphids.
  See Macrosiphum, Aphis.

Aphis (Siphocorynæ) avenæ Fab. The European Grain Aphis.
  Aphidius obscuripes Ashm.
    Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1895, p. 137. Fletcher, Muskoka, Ont.

Aphis brassicæ L. The Cabbage Aphis.
  Lipolexis (Aphidius) rapæ Curtis.
    Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, 1904, p. 228. Fletcher, Ottawa, Ont.

Aphis—on Raspberry.
  Lygocerus stigmatus (Say) Ashm.
    Proctotrupid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1887, p. 36. Fletcher, Ottawa, Ont.

Apina.
  See Bees, Megachile.

Argyresthia thuiella Pac. The White Cedar Twig Borer.
  Pentachnemus bucculatricis How.
    Chalcid. Rpt. Dom. Ent. Cent. Exp. Farm, Canada, 1906, p. 231. Fletcher, Ottawa, Ont.
  Derostenes trifasciatus Ashm.
    Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1906, p. 231. Fletcher, Ottawa, Ont.

Asparagus Beetle.
  See Crioceris.

Army Worm.
  See Cirphis.

Aspidiotus ostræformis Curtis. The European Fruit Scale.
  Aphelinus mytilaspidis Baron.
    Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Aspidiotus perniciosus Coms. The San José Scale.
  Aphelinus fuscipennis How.
    Chalcid. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 53. Jarvis, Ontario.
    Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

APHELINUS MYTILASPIDIS Baron.
Chalcid. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 53. Jarvis, Ontario.
Rpt. XLI., Ont. Ent. Soc., 1910, p. 74. Eastham, Guelph, Ont.

Aster Gall Moth.
See Gelechia.

Aulacaspis rosæ Bouche. The Rose Scale.
APHELINUS DIASPIDIS How.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Bassus albosignatus Grav. See Syrphus ribesii.
ASAPHES VULGARIS Walk.
Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 172.
Fletcher, Ottawa, Ont.

Bees.
FOENUS INCERTUS Cress.
FOENUS TARSATORIUS Say.
Evaniids. Faune Ent. Canada, 1883, p. 246. Provancher, Quebec.
Rpt. XXI., Ent. Soc. Ont., 1890, p. 66. Harrington, Ontario.
LEUCOSPIS AFFINIS Say.
Chalcid. Rpt. XXI., Ent. Soc. Ont., 1890, p. 71. Harrington, Ontario.

Birch Sawfly.
See Hylotoma.

Blackberry Scale.
See Eulecanium.

Brown-tail Moth.
See Euproctis.

Bud Moth.
See Tmetocera.

Cabbage Aphis.
See Aphis brassicæ.

Cabbage Root Maggot.
See Phorbia.

Cabbage White Butterfly.
See Pontia.

Cecropia Moth.
See Samia.

Cedar Twig Borer.
See Argyresthia.

Celery Caterpillar.
See Papilio.

Cigar Case Bearer.
See Coleophora.

Chionaspis furfura Fitch. The Scurfy Scale.
ABLERUS CLISIOCAMPÆ (Ashm) How.
Chalcid. Rpt. XXXVIII., Ent. Soc. Ont., 1907, p. 71. Jarvis, Ontario.
Rpt. XLI., Ent. Soc. Ont., 1910, p. 75. Eastham, Guelph, Ont.

Chionaspis pinifoliæ Fitch. The Pine Leaf Scale.
APHELINUS MYTILASPIDIS Baron.
Chalcid. Rpt. XLI., Ent. Soc. Ont., 1910, p. 74. Eastham, Guelph, Ont.
PHYSCUS VARIICORNIS How.
Chalcid. Rpt. XLI., Ent. Soc. Ont., 1910, p. 75. Eastham, Guelph, Ont.

Chionaspis salicis Linn. The Willow Scale.

APHELINUS MYTILASPIDIS Baron.

Chalcid. Rpt. XLI., Ent. Soc. Ont., 1910, p. 74. Eastham, Guelph, Ont.

Cimbex americana Leach. The Willow Sawfly.

OPHELTES GLAUCOPTERUS (L) Holmgr.

Ichneumon. Faune, Ent. Canada, 1883, p. 350. Provancher, Quebec.

Can. Ent. XIX., 1887, p. 80. Fletcher, Ottawa, Ont. On pupa.

5th Ann. Rpt. Quebec Society Protection of Plants, 1912-1913, p. 28. Fyles.

Cirphis (Leucania) unipuncta How. The Army Worm.

OPHION PURGATUS Say.

Ichneumon. Faune. Ent. Canada, 1883, p. 351. Provancher, Que.

Rpt. XXI., Ent. Soc. Ont., 1890, p. 67. Harrington, Ontario.

Rpt. XXVII., Ent. Soc. Ont., 1896, p. 51. Panton. Generally distributed in Ontario.

ICHNEUMON LEUCANIÆ Fitch.

Ichneumon. Rpt. XXVII., Ent. Soc. Ont., 1896, p. 51. Panton, Ontario. Generally distributed.

PANISCUS GEMINATUS Say.

Guelph, Ont. Treesbank, Man.

PIMPLIDEA PEDALIS (Cress).

Nova Scotia.

ICHNEUMON CANADENSIS Cr.

Ontario. Nova Scotia.

ICHNEUMON LÆTUS Br.

Nova Scotia. New Brunswick.

ICHNEUMON JUCUNDUS Br.

Guelph, Ont.

Ichneumons. Bull. 9, Ent. Branch Dom. Can. Dept. Agr., 1915. Gibson.

APANTELES MILITARIS Walsh. (Ontario.)

APANTELES LIMENTIDIS Riley. (Nova Scotia.)

METEORUS COMMUNIS Cr. (Ontario.)

Braconids. Bull, 9, Ent. Branch, Dom. Can. Dept. Agr., 1915. Gibson, Ont.

WAGNERIA (PHORICHÆTA) SEQUAX Will.

Tachinid. Bull. 9, Ent. Branch Dom. Can. Dept. Agr., 1915. Gibson, Guelph, Ont.

EXORISTA FLAVICAUDA Ril.

Tachinid. Rpt. Dom. Ent. Cen. Exp. Farm, 1896, p. 238. Fletcher, Ontario.

NEMOREA LEUCANIÆ Kirkp.

Tachinid. Rpt. XXVII., Ent. Soc. Ont., 1896, p. 102. Fyles. Levis, Que.

WINTHEMIA QUADRIPUSTULATA Fab.

Tachinid. Bull. 9, Ent. Branch, Dom. Can. Dept. Agr., 1915. Gibson, Ontario; Nova Scotia.

PHOROCERA (EUPHOROCERA) CLARIPENNIS Macq.

Tachinid. Bull. 9, Ent. Branch, Dom. Can. Dept. Agr., 1915. Gibson, Guelph, Ont.

PHRYXE (EXORISTA) VULGARIS Fall.
Tachinid. Bull. 9, Ent. Branch, Dom. Can. Dept. Agr., 1915. Gibson. New Brunswick. Nova Scotia.

Coccotorus scutellaris Le Conte. The Plum Gouger.
SIGALPHUS CANADENSIS Prov.
Braconid. Faune. Ent. Canada, 1883, p. 530. Provancher, Que.
Can. Ent. XXII., 1890, p. 115. Gillette.

Coccus hesperidum Linn. The Soft Scale.
COCCOPHAGUS COGNATUS How.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Codling Moth.
See Cydia.

Coleophora fletcherella Fernald. The Cigar Case Bearer.
MICRODUS LATICINCTUS Ash.
Braconid. Rpt. XXVII., Ont. Ent. Soc., 1896, p. 67. Fletcher, Port Hope, Ont.

Colias philodice Godt. The Clouded Sulphur.
MEGORISMUS NUBILIPENNIS Ashm.
Ichneumon. Rpt. Ent. Cen. Exp. Farm, Canada, 1887, p. 18. Fletcher, on larva, Ottawa, Ontario.

Conotrachelus nenuphar Herbst. Plum Curculia.
THERSILOCHUS CONOTRACHELI Ril.?
Ichneumon. Rpt. XXI. 1890, p. 67. Ont. Ent. Soc. Harrington, Ont.

Cottony Maple Scale.
See Pulvinaria.

Crioceris asparagi L. The Asparagus Beetle.
TETRASTICHUS ASPARAGI Cwfd.
Chalcid. Agricultural Gazette, Canada, November, 1915, p. 1055. Ross, on egg, Vineland, Ont.

Currant Sawfly.
See Pteronus.

Cutworm.
See Hadena, Mamestra, Noctua, Peridroma.

Cydia pomonella Linn. The Codling Moth.
PIMPLA PTERELAS (Say) Walsh.
Ichneumon. Rpt. XXXVII. Ent. Soc. Ont., 1906, p. 5. Brodie, Freeman, Ont.
EPHIALTES sp.
Ichneumon. Rpt. XXXVII. Ent. Soc. Ont., 1906, p. 5. Brodie, Prescott, Ont.

Diamond Back Moth.
See Plutella.

Dog-wood Sawfly.
See Harpiphorus.

Eriopeltis festucæ Fonse. The Grass Scale.
LEUCOPSIS BELULILA.
Dipterous. Rpt. XLI., Ent. Soc. Ont., 1910, p. 76. Jarvis, Nova Scotia.

Eulecanium caryæ Fitch.
CHILONEURUS ALBICORNIS How.
Chalcid. Rpt. XLI., Ent. Soc. Ont., 1910, p. 75. Eastham, Guelph, Ont.

EUCOMYS SCUTELLATA (Swed.) D. T.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

AGENIASPIS FUSCICOLLIS (Dalm) Thoms.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Eulecanium cerasifex Fitch. The New York Plum Scale.

PACHYNEURON ALTISCOTA How.
Chalcid. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 65. Jarvis, Ont.

EUNOTUS LIVIDUS Ashm.
Chalcid. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 65. Jarvis, Ont.

CHILONEURUS ALBICORNIS How.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

EUCOMYS FUSCA (How.) D. T.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

COCCOPHAGUS LECANII Smith.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

COCCOPHAGUS FLAVOSCUTELLUM Ashm.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

COCCOPHAGUS COGNATUS How.
Chalcid. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 65. Jarvis Ont.
Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

AGENIASPIS FUSCICOLLIS (Dalm.) Thoms.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

APHYCUS PULVINARIÆ How.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

APHYCUS JOHNSONI.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

APHYCUS FLAVICEPS.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Jarvis, Guelph, Ont.

BLASTOTHRIX LONGIPENNIS How.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Eulecanium fitchii Sign. The Blackberry Soft Scale.

ENCYRTUS FUSCUS How.
APHYCUS ANNULIPES (Ashm) How. } (Chalcids.)
COCCOPHAGUS FLAVOSCUTELLUM Ashm.

EUTOCHUS XANTHOTHORAX Ash. (Proctotrupid.)
Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1901, p. 241. Fletcher, Trenton, Ont.

Eulecanium fletcheri Ckll.

COCCOPHAGUS LECANII Smith.
COCCOPHAGUS COGNATUS How.
COCCOPHAGUS FLETCHERI How.

Comys bicolor How.
Chiloneurus albicornis How.
Aphycus jarvisi How.
Aphycus pulvinariæ How.
Blastothrix longipennis How.
Chalcids. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Euproctis chrysorrhoea L. The Brown Tail Moth.
Pentarthrum minutum Ril.
Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, 1911, p. 217. Hewitt, St. Stephen, New Brunswick.
Apanteles lacteicolor Vier.
Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1914. p. 860. Hewitt, Bear River, Nova Scotia.
Compsilura concinnata Meig.
Tachinid. Rpt. XLIII., Ont. Ent. Soc., 1912, p. 57. Tothill, Fredericton, New Brunswick.
Phorocera leucaniæ Cog.
Tachinid. Rpt. XLIII., Ont. Ent. Soc., 1912, p. 58. Tothill, Charlotte County, New Brunswick.

Euthisanotia grata Fab. The Beautiful Wood Nymph.
Exorista leucania.
Tachinid. Rpt. I., Ont. Ent. Soc., 1870, p. 99. Saunders, Ont.

Fall Canker Worm.
See Alsophila pometaria.

Fall Webworm.
See Hyphantria.

Gelechia gallæasteriella Kell. The White Aster Gall Moth.
Bracon furtivus Fyles.
Braconid. Can. Ent. XXIV., 1892, p. 34. Fyles, South Quebec, Que.
Pimpla pterelas (Say) Walsh.
Ichneumon. Can. Ent. XXIV., 1892, p. 35. Fyles, South Quebec, Que.
Trychosis tunicula-rubra Fyles.
Ichneumon. Rpt. XXXIV., Ent. Soc. Ont., 1903, p. 73. Fyles, Levis, Que.

Grain Aphids.
See Aphis avenæ.

Grapta satyrus Edw. Polygonia satyrus Edw.
Ichneumon caliginosus Cress.
Ichneumon. Entomological Record, Ont. Ent. Soc., 1907, p. 16. Gibson. Ex pupa. Kaslo, B.C.; Ottawa, Ont.
Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 128. Fletcher. Ex pupa. Ottawa, Ont.

Grapevine Sphinx.
See Amphelophaga.

Grass Scale.
See Eriopeltis.

Hadena devastatrix Brace. Glassy Cutworm.
Berecyntus bakeri How. Var.
Chalcid. Bull. 10, Ent. Branch, Dom. Can. Dept. Agri., 1915. Gibson, Ottawa, Ont.

Halisidota maculata Harr.
Ichneumon. THERONIA MELANOCEPHALA (Brulle) Prov.
Rpt. XXI., Ont. Ent. Soc., 1890, p. 69. Harrington, Ottawa, Ont.
PIMPLA PEDALIS Cress.
Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1908, p. 209. Fletcher, Eastern Canada.

Harmologa.
See Tortrix.

Harpiphorus tarsatus (Say) Nort. The Dog-wood Sawfly.
HEMITELES MUCRONATUS Prov.
Ichneumon. Rpt. XXX., Ont. Ent. Soc., 1899, p. 104. Fyles, Levis, Que.

Hemerocampa leucostigma S. and A. The White Marked Tussock Moth.
PIMPLA INQUISITORIELLA D.T. Recorded as Inquisitor.
Ichneumon. Rpt. XXVII., Ont. Ent. Soc., 1896, p. 53. Panton, Toronto, Ont.
DIGLOCHIS OMNIVORA Walk.
Chalcid. Rpt. XXXVI., Ont. Ent. Soc., 1905, p. 19. Lyman, Montreal, Que.

Hessian Fly.
See Phytophaga.

Heterocampa manteo Dbl.
OPHION BILINEATUS Say.
Ichneumon. Rpt. XXXIV., Ont. Ent. Soc., 1903, p. 58. Gibson, Meach Lake, Que. On larva.

Hickory Leaf Roller.
See Ambesa Walsinghami Rag.

Hop Vine Borer.
See Hydroecia.

Hylotoma pectoralis Leach. The White Birch Sawfly.
PIMPLA INQUISITORIELLA D.T. (Recorded as Inquisitor.)
Ichneumon. Rpt. XXX., Ont. Ent. Soc., 1899, p. 104. Fyles, Levis, Que.
5th Annual Rpt. Quebec Society for Protection of Plants, 1912-1913, p. 30. Fyles, Quebec.

Hyphantria cunea Dru. Fall Webworm.
LIMNERIUM VALIDUM Cress.
LIMNERIUM PILOSOTUM Cr.
EXOCHILUM MUNDUM Say.
Ichneumons. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1914, p. 861. Hewitt, New Brunswick.
COMPSILURA CONCINNATA Meig.
Tachinid. Rpt. XLIII., Ont. Ent. Soc., 1912, p. 57. Tothill, on larva. Fredericton, New Brunswick.

Hydræcia immanis Guen. Hop Vine Borer.
ICHNEUMON JUCUNDUS Brulle.
Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, 1892, p. 150. Fletcher, Bethel, Ont.

Iris Pod Weevil.
See Mononychus.

Isosoma tritici Fitch. The Wheat Joint Worm.
 HOMOPORUS CHALCIDIPHAGUS Walsh.
 EUPELMUS EPICASTE Walk.
  Chalcid. Rpt. XXIX., Ont. Ent. Soc., 1898, p. 77. Fletcher, Verdun, Ont.

Kermes pubescens Bogue.
 APHYCUS PULCHELLUS How.
 BLASTOTHRIX LONGIPENNIS How.
  Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Larch Sawfly.
 See Nematus.

Lecanium Scale (Soft Scale).
 See Coccus.

Lepidosaphes ulmi Linn. The Oyster Shell Scale.
 APHELINUS MYTILASPIDIS Baron.
  Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.
  Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1903, p. 188. Fletcher, generally distributed in South Western Ontario.
  Rpt. Dominion Entomologist, 1887, p. 31, British Columbia.
  Rpt. Dominion Entomologist, 1903, p. 188, universally distributed.
  Rpt. Dom. Ent. Exp. Farm, Canada, 1887, p. 31. Fletcher, New Westminster, B.C.

Lyctus unipunctatus Herbert.—linearis. The Powder Post Beetle.
 HECABALUS LYCTI Cress.
 HECABALUS UTILIS Cress.
  Braconid. Rpt. XXXII., Ont. Ent. Soc., 1901, p. 108. Fletcher, Ottawa, Ont.

Macrosiphum granaria Buckton. Grain Aphis.
 APHIDIUS GRANARIAPHIS Cook.
  Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1898, p. 179. Fletcher, Ont.
  Can. Ent. Vol. XXIV., 1890, p. 125.
 LYSIPHLEBUS TRITICI Ashm.
  Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1908, p. 194. Fletcher, Ontario.
 APHIDIUS AVENÆ Fitch.
  Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1903, p. 171. Fletcher, Ottawa, Ont.
 ASAPHES VULGARIS Walk.
  Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1903, p. 171. Fletcher, Ottawa, Ont.
 LYGOCERUS NIGER How.
  Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1903, p. 171. Fletcher, Ottawa, Ont.
 ALLOTRIA TRITICI Fitch.
  Cynipid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1903, p. 171. Fletcher, Ottawa, Ont.

Macrosiphum pisi Kalt. The Pea Aphis.
 TRIOXYS (PRAON) CERASAPHIS Fitch.

APHIDIUS FLETCHERI Ash.

Braconid. Rpt. XXX., Ont. Ent. Soc., 1899, p. 107. Fletcher, Ottawa, Ont.

Rpt. Dom. Ent. Cen. Exp. Farm, 1899, p. 172. Fletcher, Ottawa, Ont.

MEGORISMUS FLETCHERI Crawford.

Chalcid. Rpt. XL., Ont. Ent. Soc., 1909, p. 14. Gibson, Ottawa, Ont.

Malacosoma disstria Fab. The Forest Tent Caterpillar.

APANTELES LONGICORNIS Prov.

Braconid. Rpt. XXXIV., Ont. Ent. Soc., 1903, p. 73. Fyles, Levis, Que.

PIMPLA CONQUISITOR (Say) Ril.

Ichneumon. Rpt. XXI., Ont. Ent. Soc., 1890, p. 69. Harrington, Ottawa, Ont.

PIMPLA PEDALIS Cress.

Ichneumon. Rpt. XXI., Ont. Ent. Soc., 1890, p. 69. Harrington, Ottawa, Ont.

Mamestra picta Harris. The Zebra Caterpillar.

OPHION PURGATUS Say.

Ichneumon. Can. Ent. XVI., 1884, p. 122. Caulfield, Montreal, Que.

CHAETOSTRICHA (TRICHOGRAMMA) PRETIOSA D.T.

Chalcid. Rpt. XXVII., 1896, Ont. Ent. Soc., p. 64. Fletcher, Ottawa. Ont.

Rpt. Dom. Ent. Cen. Exp. Farm, 1892, p. 161. Fletcher, on egg, Ottawa, Ont.

Mamestra trifolii Rott. Clover Cutworm.

OPHION PURGATUS Say.

Ichneumon. Rpt. XIX., Ont. Ent. Soc., 1888. Fletcher, Ontario, on pupa.

Marumba modesta Harris.—Pachysphinx modesta Harr.

WINTHEMIA QUADRIPUSTULATA Fab.

Tachinid. Entomological Record, Ont. Ent. Soc., 1903, p. 99. Gibson, St. John, New Brunswick.

Megachile brevis Say. Leaf Cutter Bee.

LEUCOSPIS AFFINIS Say.

Chalcid. Rpt. XVII., Ont. Ent. Soc., 1886, p. 52. Guignard, Ottawa, Ontario, on larva.

Megachile centuncularis L. Leaf Cutter Bee.

SEMIOTELLUS CUPREUS Prov.

Chalcid. Rpt. XVII., Ont. Ent. Soc., 1886, p. 52. Guignard, Ottawa, Ont., on larva.

Meromyza americana Fitch. (Causing " Silver Top " in grass.)

COELINIUS MEROMYZÆ Forb.

Braconid. Rpt. XXII., Ont. Ent. Soc., 1891, p. 13. Bethune, Ont.

Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1887, p. 68. Fletcher, Ottawa, Ont.

Monarch Butterfly.

See Anosia.

Monohammus confusor. The Pine Borer.

RHYSSA PERSUASORIA (L.) Grav.

Ichneumon. Faune. Ent. Canada, 1883, p. 448. Provancher, Quebec.

Monohammus scutellatus. The Pine Borer.
    RHYSSA PERSUASORIA (L.) Grav.
        Ichneumon. Faune. Ent. Canada, 1883, p. 448. Provancher, Que.

Mononychus vulpeculus. The Iris Pod Weevil.
    ? PIMPLA PTERELAS (Say) Walsh.
        Ichneumon. Rpt. XXI., Ont. Ent. Soc., 1890, p. 69. Harrington, Ottawa, Ont.
    ? PIMPLA INQUISITORIELLA D.T. Recorded as Inquisitor Say.
        Ichneumon. Rpt. XLI., Ont. Ent. Soc., 1910, p. 31. Fyles, Hull, Que.

Nematus erichsonii. The Larch Sawfly.
    COELOPISTHIA NEMATICIDA Pack.
        Chalcid. Bull. 10, 2nd Series, Div. of Ent., Dom. Can., Dept. Agr., Hewitt, on pupa, Ottawa, Ont.

Noctua c-nigrum Linn. The Spotted Cutworm.
    EUPLECTRUS FRONTALIS How.
        Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1900, p. 228. Fletcher, Ontario.

Notolophus antiqua Linn. The Rusty Tussock Moth.
    TELENOMUS DALMANII (Ratz) Mayr.
        Proctotrupid. Rpt. XLI., Ont. Ent. Soc., 1910, Ent. Record, p. 118. Gibson, ex egg, Little Bras d'Or, Cape Breton, N.S.

Oak Looper.
    See Therina.

Orgyia sp.
    TELENOMUS ORGYIÆ Fitch.
        Proctotrupid. Bull. 45, U.S.N.A., p. 53. Ashmead, per Harrington, Ottawa, Ontario, on egg.

Ostræformis Scale.
    See Aspidiotus.

Oyster Shell Bark Louse.
    See Lepidosaphes.

Papilio eurymedon Boisd.
    TROGUS FLETCHERI Harrgt.
        Ichneumon. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 128, on pupa, Wellington, B.C. Taylor.
    TROGUS FULVIPES Cress.
        Ichneumon. Entomological Record, Ont. Ent. Soc., 1907, p. 16. Gibson (Cockle), Kaslo, B.C. Ex pupa.

Pamphila metacomet Harr.
    TELENOMUS PAMPHILÆ Ash.
        Proctotrupid. Rpt. XXV., Ont. Ent. Soc., 1894, p. 4. Fletcher, Ottawa, Ont.

Papilio polyxenes Fab. The Celery Caterpillar.
    TROGUS VULPINUS (Syn. Exesorius).
        Ichneumon. Faune. Ent. Canada, 1883, p. 303. Provancher, Que.
        Rpt. XXI., Ont. Ent. Soc., 1890, p. 66. Harrington, Ont.

Papilio troilus Linn.
    TROGUS FULVIPES Cress.
        Ichneumon. Rpt. XL., Ont. Ent. Soc., 1909, p. 82, on pupa. Fyles, Que.

Papilio turnus L.

TROGUS FULVIPES Cress.

Ichneumon. Rpt. XXXVIII., Ont. Ent. Soc., 1907, p. 128, on pupa, Digby, N.S. Aweme, Man. Fletcher.

Entomological Record, Ont. Ent. Soc., 1907, Gibson, Digby, N.S. Aweme, Man.

TRICHOGRAMMA INTERMEDIUM How.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1892, p. 160. Fletcher, on egg, Ottawa, Ont.

Peridroma saucia Hbn. The Variegated Cutworm.

METEORUS VULGARIS Cress.

Braconid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1900, p. 226. Fletcher, Vancouver, B.C.

Phytophaga destructor Say. The Hessian Fly.

MERISUS DESTRUCTOR (Say) Ril.

CHALCID. Rpt. II., Ont. Ent. Soc., 1871, p. 394. Bethune, Ont., on pupa.

Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1889, p. 63. Fletcher, Thornbury, Ont., and Prince Edward Island.

Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 169. Fletcher, Portage la Prairie, Man.

HOMOPORUS SUBAPTERUS Ril.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1889, p. 63. Fletcher, Thornbury, Ont.

PLATYGASTER sp. (? herricki) Pack.

Proctotrupid. Rpt. II., Ont. Ent. Soc., 1871, p. 394. Bethune, Ont., on egg.

POLYGNOTUS HIEMALIS (Forb.) Ash.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 169. Fletcher, Emerson, Man.

TETRASTICHUS PRODUCTUS Ril.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 169. Fletcher, Prince Edward Island.

ENTEDON? METALLICUS (Nees) Walk.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 169. Fletcher, Prince Edward Island.

EUPELMUS ALLYNII French.

Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 169. Fletcher, Prince Edward Island.

Phorbia (Pegomyia) brassicæ Bouche. The Cabbage Root Maggot.*

TRYBLIOGRAPHA ANTHOMYIÆ.

Cynipid, 5th Annual Rpt. Quebec Society for the Protection of Plants, 1913-1914, p. 41. Du Porte, Macdonald College, Que.

ALEOCHARA ANTHOMYIÆ Sprague.

Staphilinid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1890, p. 164. Fletcher, Ottawa, Ont.

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*(NOTE.—Parasites of this insect are under consideration in a bulletin on Root Maggots now in course of preparation in the Entomological Branch, Ottawa, by Gibson and Treherne, January, 1916.)

PACHYCREPOIDEUS DUBIUS Ashm.
Chalcid. Rpt. XLI., Ont. Ent. Soc. Ent. Record, 1910, p. 118. Gibson. ? Puparia, Ottawa, Ont.

Pigeon tremex.
See tremex.

Pine Borer.
See Monohammus.

Pine Leaf Scale.
See Chionaspis.

Plum Scale.
See Eulecanium.

Plum Curculio.
See Conotrachelus.

Plum Gouger.
See Coccotorus.

Plutella maculipennis Curt. The Diamond Back Moth.
LIMNERIUM PARVUM (Prov.) D. T.
Ichneumon. Rpt. XXX., Ont. Ent. Soc., 1899, p. 108. Fletcher, Ottawa, Ont.
Rept. Dom. Ent. Cen. Exp. Farm, Canada, 1890, p. 167. Fletcher. Generally distributed throughout Canada.
PHÆOGENES DISCUS Cress.
Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1890, p. 167. Fletcher, Indian Head, Sask.; Ottawa, Ont.

Polyphemus moth.
See Telea.

Polygonia interrogationis Fab.
PTEROMALUS VANESSÆ Harris.
Ichneumon. Rpt. III., Ont. Ent. Soc., 1872, p. 32. Bethune. Ontario, on pupa.

Pontia rapæ Linn. The Cabbage White.
PTEROMALUS PUPARUM (L) Swed.
Ichneumon. Can. Ent. Nov., 1871, Vol. III., No. 10. Lintner, introduction report.
Rpt. VI., Ont. Ent. Soc., 1875, p. 32. Saunders, Eastern Canada, on pupa.
Rpt. VII., Ont. Ent. Soc., 1876, p. 40. Saunders, London, Ont.
Rpt. VIII., Ont. Ent. Soc., 1877, p. 5. Saunders, review of distribution.

Powder Post Beetle.
See Lyctus.

Protoparce quinquemaculata How. The Tomato Sphinx.
APANTELES CONGREGATUS (Say) Prov.
Braconid. Rpt. XXIV., Ont. Ent. Soc., 1893, p. 27. Harrington, Ont.
Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1892, p. 161. Fletcher, generaally distributed over Western Ontario, ex pupa.

Pteronus ribesii Scop. The Imported Currant Worm.
HEMITELES NEMATIVORUS Walsh.
Ichneumon. Can. Ent. Vol. II., No. 2, Oct., 1869, p. 11. Walsh, Ont.
Rpt. II., Ont. Ent. Soc., 1871. Saunders (Bethune), Port Hope, Ont.

CHÆTOSTRICHA (TRICHOGRAMMA) sp. (near pretiosa) Ril.
Chalcid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1892, p. 159. Fletcher, on egg, Arnprior, Ont.

Pulvinaria innumerabilis Rath. The Cottony Maple Scale.
COCCOPHAGUS LECANII Smith.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.
COCCOPHAGUS FLAVOSCUTELLUM Ashm.
Chalcid. Rpt. XLI., Ont. Ent. Soc., 1910, p. 75. Eastham, Guelph, Ont.

Pyrameis cardui. The Painted Lady.
ICHNEUMON RUFIVENTRIS Brulle.
Ichneumon. Rpt. XI., Ont. Ent. Soc., 1881, p. 29. Huestis, St. John, N.B., on larva.

Raspberry aphis.
See Aphis.

Red Humped Apple Tree Caterpillar.
See Schizura.

Rose Scale.
See Aulacaspis.

Rusty Tussock Moth.
See Notolophus.

Samia cecropia Linn. The Cecropia Moth.
CRYPTUS NUNCIUS Say.
Ichneumon. Rpt. XXV., Ont. Ent. Soc., 1894, p. 55. Harrington, Ont., on larva.

San José Scale.
See Aspidiotus.

Schizura concinna S. & A. Red Humped Apple Tree Caterpillar.
OPHION PURGATUS Say.
Ichneumon. Rpt. Dom. Ent. Exp. Farm, Canada, 1887, p. 34. Fletcher, Ont.
LIMNERIUM GUIGNARDII (Prov.) D. T.
Ichneumon. Rpt. Dom. Ent. Exp. Farm, Canada, 1887, p. 34. Fletcher, Ottawa, Ont.
Also Nova Scotia, Rpt. Dom. Ent. 1906, p. 228.

Scolytus (Eccoptogaster) rugulosus Ratz. The Shot Hole Borer.
CHIROPACHYS COLON (L) Westw.
Chalcid. Rpt. XL., Ont. Ent. Soc., 1909, p. 18. Caesar, St. Catharines, Ont.

Scurfy Scale.
See Chionaspis.

Shot Hole Borer.
See Scolytus.

Syrphus ribesii L.
BASSUS ALBOSIGNATUS Grav. (Lœtatorius Fab.)
Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1899, p. 172. Fletcher, Ottawa, Ont.

Telea Polyphemus Cram. The Polyphemus Moth.
CRYPTUS NUNCIUS Say. (Syn. extrematis.)
Ichneumon. Faune. Ent. Canada, Hym. 1883, p. 340. Provancher, Que.

Rpt. XXI., Ont. Ent. Soc., p. 67. Harrington, Ont.

OPHION MACRURUS (L) Westw. (Syn. macrurum.)

Ichneumon. Faune. Ent. Canada, 1883, p. 350. Provancher, Que.

Rpt. III., Ont. Ent. Soc., 1872, p. 40. Reed, London, Ont.

Rpt. XXI., Ont. Ent. Soc., 1890, p. 67. Harrington, Ottawa, Ont.

Tent Caterpillar.

See Malacosoma.

Therina somniaria Hulst. Vancouver Island Oak Looper.

ICHNEUMON CESTUS Cress.

Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada. Fletcher, 1890, p. 177. Victoria, B.C.

PIMPLA ELLOPIÆ Harrington.

Ichneumon. Can. Ent. Vol. XXIV., 1892, p. 99. Harrington, Victoria, B.C., ex pupa.

Rpt. Dom. Ent. Cen. Exp. Farm, Canada. Fletcher, 1892, p. 160.

PIMPLA ONTARIO Cress.

Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1904, p. 245. Fletcher, Victoria, B.C.

PIMPLA SCRIPTIFRONS Cress.

Ichneumon. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1905, p. 194. Fletcher, Victoria, B.C.

TELENOMUS sp.

Proctotrupid. Rpt. Dom. Ent. Cen. Exp. Farm, Canada, 1892, p. 160. Fletcher, on egg, Victoria, B.C.

Tmetocera ocellana Schiff. The Bud Moth.

PIMPLA CONQUISITOR (Say) Ril.

Ichneumon. 7th Ann. Rpt. Quebec Society for Protection of Plants, 1914-1915, p. 76. Du Porte, Macdonald College, Que.

PENTARTHRON MINUTUM Ril. Syn. Trichogramma pretiosa Ril.

Chalcid. 7th Ann. Rpt. Quebec Society for Protection of Plants, 1914-1915. Du Porte, Macdonald College, Que., ex eggs.

BASSUS EARINOIDES Cress.

Ichneumon. 7th Ann. Rpt. Quebec Society for Protection of Plants, 1914-1915. Du Porte, Macdonald College, Que.

Tomato Sphinx.

See Protoparce.

Tortrix (Harmologa) fumiferana. The Spruce Bud-worm.

PENTARTHRON MINITUM.

Chalcid. Rpt. XLII., Ont. Ent. Soc., 1911, p. 26. Hewitt, on egg, Ottawa, Ont., Esquimalt, B.C., in Que.

APANTELES, sp.

Braconid. Rpt. XLII., 1911, p. 26. Hewitt, in Quebec and British Columbia.

APANTELES FUMIFERANÆ Viereck.

Braconid. Ent. Rec., 1912, p. 134, Ont. Ent. Soc. Quebec.

NASONIA TORTRICIS Brues.

Rpt. XLI., Ont. Ent. Soc., Gibson, 1910, p. 118, ex pupa, Baskatong, Que.

Tremex Columba Pigeon Tremex.

MEGARHYSSA LUNATOR (Fabr.) D. T.

Ichneumon. Faune. Ent. Canada, 1883, p. 446. Provancher, Que.

Can. Ent. 1882, p. 82. Harrington, Ottawa, Ont.

MEGARHYSSA ATRATA (Fabr.) D. T.
Ichneumon. Faune. Ent. Canada, 1883, p. 444. Provancher, Que.
Can. Ent. 1882, p. 82. Harrington, Ottawa, Ont.
Trichotaphe levissella Fyles.
HEMITELES MUERONATUS Prov.
Ichneumon. Rpt. XXXIII., Ont. Ent. Soc., 1902, p. 28. Fyles, Que.
LAMPRONOTA MARGINATA Prov.
Ichneumon. Rpt. XXXVIII., Ont. Ent. Soc. Ent. Record, 1907, p. 128. Gibson (Fyles) Levis, Que.
Tussock Moth.
See Hemerocampa.
Vanessa antiopa Linn. Mourning Cloak.
PTEROMALUS PUPARUM (L) Swed.
Ichneumon. Rpt. XXI., Ont. Ent. Soc., 1890, p. 72. Harrington, Ottawa, Ont.
Willow Saw Fly.
See Cimbex.
Willow Scale.
See Chionaspis.
Wheat Joint Worm.
See Isosoma.
Zebra Caterpillar.
See Mamestra.

THE ENTOMOLOGICAL RECORD, 1915.

Arthur Gibson, Chief Assistant Entomologist, Department of Agriculture, Ottawa.

It is gratifying to be able to state that the collection and study of insects is gradually but surely increasing every year in the different provinces of Canada. This, I think, is largely owing to the fact that economic, or applied, entomology is more and more receiving its due recognition. The importance of local collections of insects to the economic entomologist is indeed of great value, providing, as they do, definite information as to distribution, etc. At Ottawa, as we have previously stated, due provision has been made for a national collection of the insects of Canada, and collectors generally could aid materially in building up this collection by forwarding donations of specimens.

During 1915 much material collected in previous years has been worked over by specialists, in addition to which large collections have been made during the past season in most of the provinces. Many of these are new records for Canada, while the capture of others in certain districts or provinces extend the known range of their distribution.

As in years past we have received invaluable assistance in the determination of many specimens from the recognized authorities in the United States and elsewhere. Our special thanks are due to Dr. L. O. Howard and his associates at Washington—Dr. Dyar, Dr. Banks, Messrs. Schwarz, Crawford, Busck, Rohwer, Gahan and Knab; Sir George F. Hampson, of the British Museum; Prof. H. F. Wickham, of Iowa City, Iowa; Mr. E. P. Van Duzee, of Berkeley, Cal.; Dr. Henry Skinner, of Philadelphia; Col. Thos. L. Casey, of Washington, D.C.; Mr. C. W. Johnson, of Boston, Mass.; Mr. Chas. Liebeck, of Philadelphia, Pa.; Prof. H. S. Hine, of Columbus, Ohio; Dr. J. M. Aldrich, of La Fayette, Ind.; Mr. Chas. W. Leng, of New York, N.Y.; Dr. W. G. Dietz, of Hazleton, Pa.; Dr. F. C. Fall, of Pasadena, Cal.; Mr. M. C. Van Duzee, of Buffalo, N.Y.; Mr. C. A. Frost, of South Framingham, Mass.; Dr. E. C. Van Dyke, of Berkeley, Cal.; Mr. J. R. de la Torre Bueno, of White Plains, N.Y.; Mr. F. H. Wolley-Dod, of Midnapore, Alta., and Dr. E. M. Walker, of Toronto, Ont.

LITERATURE.

Among the books, memoirs, etc., which have appeared during 1915, and which are of interest to Canadian students, the following should be mentioned:

Bethune, Rev. Prof. C. J. S. Bibliography of Canadian Entomology for the year 1913; Ottawa, Trans. Royal Soc. of Canada, Third Series—1914, Vol. VIII, Section IV, 1914. In this contribution references are given to 151 papers; 42 of these relate to Economic Entomology, 18 to General Entomology, 18 to Lepidoptera, 21 to Diptera, etc.

Banks, Nathan. The Acarina or Mites; a review of the group for the use of economic entomologists: United States Department of Agriculture, office of the secretary, Report No. 108. Received December 28th, 1915. This is indeed a very useful contribution of 153 pages. In the introduction information is given on the structure, life-history, classification, etc. Then follows a lengthy discussion on the different families, and many keys are given. Notes on collecting, preserving and rearing mites are given on pages 141 and 142, and on pages 143-145 a list of works, useful in the study of American Acarina, is given.

Braun, Annette Frances. Evolution of the color pattern in the Microlepidopterous Genus Lithocolletis: Journal of the Academy of Natural Sciences of Philadelphia, Vol. XVI, Second Series, Philadelphia, pp. 105-168, plates III and IV, 26 text figures. A separate of this article (issued February 12th, 1914) has recently been received. Under "Methods and Observations" the author discusses (a) Systematic Position and Characteristics of Lithocolletis, (b) Color Classes Represented and Structure of Scales, (c) Comparative Study of the Adult Markings, (d) Ontogenetic Development of the Color Pattern and (e) Phylogenetic Development of the Color Pattern. The two plates, in colors, at the end of the article well illustrate the various species of the genus. The paper is a most interesting one and undoubtedly of much value.

Brues, Charles T., and Melander, A. L. Key to the Families of North American Insects: published by the authors; Boston, Mass., and Pullman, Wash., 1915, pp. 1-140. As stated by the authors this manual brings together a brief, yet complete, key to the families of American insects, unhampered by more than the explanations needed to make such a tabulation available to the general student. It has been prepared to meet the requirements not alone of college courses in systematic entomology, but also of agricultural high schools and of physicians, fruit inspectors, the modern farmer, the nature lover, or anyone who is concerned with the practical identification of insects. This very useful work will undoubtedly be widely received. 18 full-page plates, illustrating structural characters, etc., are included.

Casey, Thos. L. Memoirs on the Coleoptera, VI; published by the New Era Printing Company, Lancaster, Pa.; issued November 27th, 1915, pp. 1-460. The contents of this the sixth memoir by this well-known coleopterist consists of: Part I, A Review of the American Species of Rutelinæ, Dynastinæ and Cetoniinæ, pp. 1-394; Part II, Studies in some Staphylinid Genera of North America, pp. 395-450. A large number of new species are described, seventeen of which are from Canada.

Fracker, Stanley Black. The Classification of Lepidopterous Larvæ, with ten plates: Illinois Biological Monographs, No. 1, Vol. II, July, 1915; published by the University of Illinois, under the auspices of the Graduate School, Urbana, Ill., pp. 1-169, (contribution No. 43, from the Entomological Laboratory of the University of Illinois). This contribution is divided into two sections, namely, Part one—The Homology of the Setæ, and Part two—Systematic Outline of Families and Genera. The work is a most interesting one. The author in Part One suggests the adoption of Greek letters in place of the Roman numerals now generally used to designate the different tubercles. In the second part, family and generic keys are given, based on larval characters. The plates at the end illustrate arrangement of setæ, etc. This contribution is indeed a valuable one and will doubtless receive much consideration from lepidopterists generally.

Hampson, Sir George F. (Bart). Catalogue of the Lepidoptera Phalaenæ in the British Museum; Supplement, Vol. I, Catalogue of the Amatidæ and Arctiadæ, (Nolinæ and Lithosianæ). Received 19th January, 1915. Since the publication of the first two volumes of the "Catalogue of Moths" a large number of species in the families of which they treat have been described, and the newly published supplement brings the subject matter of Vols. I and II up to date. In the Family Amatidæ, 29 species are described as new, none of which, however, are from North America. In the Arctiadæ, descriptions of 122 new species appear—all exotic. Plates, in colours, numbered I to XLI accompany the volume.

Herrick, Glenn W. Insects Injurious to the Household and Annoying to Man. New York, The Macmillan Company, pp. 1-470. This book which appeared late in 1914, was written particularly for the housekeeper and for those who desire information regarding household pests and practical methods of controlling them. The work is a valuable one and will certainly prove a handy volume of reference. It is profusely illustrated and is one of the Rural Science Series.

Holland, W. J. The Butterfly Guide; a pocket manual for the ready identification of the common species found in the United States and Canada. Published by Doubleday, Page & Co., New York. This pocket guide is similar in form to the popular bird, flower and tree guides. It consists of 237 pages and is illustrated with 295 colored figures, representing 255 species and varieties. There are also five plates, in explanation of structure, venation, metamorphosis, and the apparatus required for collecting, rearing and mounting specimens. This convenient little manual should have a ready sale among nature lovers generally.

Hopkins, A. D. Contributions Toward a Monograph of the Scolytid Beetles; Part II, Preliminary Classification of the Superfamily Scolytoidea. Tech. Series No. 17, United States Department of Agriculture, Bureau of Entomology; issued January 9th, 1915. The author states in the introduction that the object of this contribution is to discuss the taxonomy and present a preliminary classification of the families and subfamilies of the scolytid beetles of the world. The discussion and classification are based on a study of representatives of about 122 described and undescribed genera, and about 1,000 species of North America and other countries, in the collections of the United States National Museum and other institutions.

Howard, L. O., Dyar, H. G. and Knab, F. The Mosquitoes of North and Central America and the West Indies—Vol. Three, Systematic Description, Part I; Washington, D.C. Published by the Carnegie Institution of Washington, pp. 1-523. This sumptuous volume of descriptive matter appeared in October, 1915. The species of the tribes Sabethini and Culicini are described. Most of these are southern in distribution. Several species are described as new. Canadian records of nine species are given. Short chapters precede the descriptive matter, namely: "Mosquitoes, Their Definition and Position in the Classification of Insects," "Statement of Some of the Characters used in the Tables," "Outline of the Geographical Area Covered" and "Historical Sketch of the Classification of Mosquitoes."

Malloch, John R. The Chironomidæ, or Midges, of Illinois, with particular reference to the species occurring in the Illinois River; Bulletin of the Illinois State Laboratory of Natural History, Urbana, Ill., Article VI, Vol. X, May, 1915, pp. 275-538, plates XVII-XL. The opening chapters discuss "Methods of Collecting," "Methods of Rearing," "Methods of Preservation," "Synonymy Affecting Family Names" and "Biology and Taxonomy." Keys to the subfamilies follow, with a treatment of the Ceratopogoninæ, the Tanypinæ and the Chironominæ. The distribution of the Chironomidæ in the Illinois River is then stated and also a summary given of Illinois genera and species in comparison with those recorded for other states. Many species are described as new and a number of Canadian references given. The plates illustrate structural detail.

Morley, Claude. A Revision of the Ichneumonidæ based on the collection in the British Museum (Natural History), Part IV, Tribes Joppides, Banchides and Alomyides: British Museum (Natural History), 1915, pp. 167, 1 plate, coloured. Part I appeared in 1912, Part II, in 1913, and Part III, in 1914. In Part IV, issued in March, 1915, 459 species are included, 40 of which are described as new. Records are given of a number of species from Canada which are in the British Museum, one of which is described as new.

PACKARD, The late ALPHEUS SPRING. Monograph of the Bombycine Moths of North America, Including their Transformations and Origin of the Larval Markings and Armature; Part III, Families Ceratocampidæ, Saturniidæ, Hemileucidæ and Brahmæidæ. Vol. XII, First Memoir, National Academy of Sciences, Washington, D.C., 516 pp., 4to, 113 plates, 34 of which depicting larvæ are colored. Edited by T. D. A. Cockerell. This, the third part of the late Dr. Packard's work on the Bombycine Moths, appeared in the first half of the year. It is indeed a most valuable contribution and one which will be welcomed by lepidopterists everywhere as the species described are not confined to North America but occur in various parts of the world. The successful issue of this sumptuous volume is largely due to Prof. Cockerell, who undertook to edit it.

RILEY, W. A., and JOHANNSEN, O. A. Handbook of Medical Entomology; Ithaca, N.Y., The Comstock Publishing Company, 1915, pp. 1-348. This handbook will be found of much value to those of our students who are interested in the study of medical entomology. It is an outgrowth of a course of lectures along the lines of insect transmission and dissemination of diseases of man, given by the senior author in the Department of Entomology of Cornell University, during the past six years. More especially is it an illustrated revision and elaboration of his "Notes on the Relation of Insects to Disease," published in January, 1912.

THOMPSON, MILLETT TAYLOR. An Illustrated Catalogue of American Insect Galls. Edited by E. P. Felt. Published and distributed by the Rhode Island Hospital Trust Company. Received, 26th June, 1915. This catalogue is divided into: Part I, Classification by Galls, and Part II, Classification by Genera. Both of these parts treat of the Cynipidæ. On pages 50 to 66 a "Supplemental List of American Gall-making Insects" is given. At the end of the volume are 21 plates, illustrating 247 different kinds of galls. These are from photographs and are splendid reproductions. This catalogue is an important contribution. It is to be regretted that only a portion of Dr. Thompson's investigation was completed at the time of his death.

WINN, A. F. and BEAULIEU, GERMAIN. A Preliminary List of the Insects of the Province of Quebec: Part II, Diptera. Published as a supplement to the 7th Report of the Quebec Society for the Protection of Plants; received 14th June, 1915. This publication of 159 pages is a welcome one and will undoubtedly be of much value to Canadian students of diptera. It is indeed a very creditable contribution. Under each genus the species known to occur in the Province of Quebec are listed, the definite localities and months of capture being recorded. A short introductory paragraph precedes each family.

COLLECTORS.

The following is a list of the names and addresses of collectors heard from during 1915:

Baird, Thos., High River, Alta.
Beaulieu, G., Ent. Branch, Dept. Agr., Ottawa.
Beaulne, J. I., Ent. Branch, Dept. Agr., Ottawa.
Bethune, Rev. Prof., O.A.C., Guelph.
Blackmore, E. H., Victoria, B.C.

Bowers, H. L., Oshawa, Ont.
Brimley, J. F., Wellington, Ont.
Brittain, W., Agric. College, Truro, N.S.
Bush, A. H., 1105 Broadway, Vancouver, B.C.
Caesar, L., O.A.C., Guelph, Ont.
Carr, F. S., Edmonton, Alta.
Chagnon, Gus., Box 521, Montreal.
Chagnon, W., St. John's, Que.
Chrystal, R. N., Ent. Branch, Dept. Agr., Ottawa.
Cockle, J. W., Kaslo, B.C.
Cosens, Dr A., Parkdale Collegiate Institute, Toronto.
Crew, R. J., 561 Carlaw Ave., Toronto.
Criddle, Evelyn, Aweme, Man.
Criddle, Norman, Aweme, Man.
Dawson, Horace, Hymers, Ont.
Day, G. O., Duncans, B.C.
Dod, F. H. Wolley-,Midnapore, Alta.
Dunlop, James, Woodstock, Ont.
Emile, Rev. Bro., Longueuil, Que.
Evans, J. D., Trenton, Ont.
Fyles, Rev. Dr. T. W., 268 Frank St., Ottawa.
Germain, Rev. Bro., Three Rivers, Que.
Gibson, Arthur, Ent. Branch, Dept. Agric., Ottawa.
Hahn, Paul, 433 Indian Road, Toronto.
Hanham, A. W., Duncan, B.C.
Harrington, W. H., P. O. Dept., Ottawa.
Hewitt, Dr. C. Gordon, Ent. Branch, Dept. Agric., Ottawa.
Hudson, A. F., Millarville, Alta.
Johnson, Geo. S., Moose Jaw, Sask.
Kitto, V., Inland Revenue, Dept. Interior, Ottawa.
Leavitt, A. G., St. John, N.B.
Macnamara, Chas., Arnprior, Ont.
McIntosh, W., St. John, N.B.
Mignault, Rev. J. B., Saint Lambert, Que.
Moore, G. A., 850 St. Hubert St., Montreal.
Perrin, Jos., McNab's Island, Halifax, N.S.
Petch, C. E., Hemmingford, Que.
Phair, A. W. H., Lillooet, B.C.
Ruhmann, Max M., Vernon, B.C.
Ross, W. A., Vineland Station, Ont.
Roy, Henri, Quebec, Que.
Sanders, G. E., Bridgetown, N.S.
Sanson, N. B., Banff, Alta.
Simpson, W., Dominion Observatory, Ottawa.
Simms, H. M., 192 Ontario East, Montreal.
Sladen, F. W. L., Experimental Farm, Ottawa.
Strickland, E. H., Experimental Station, Lethbridge, Alta.
Swaine, J. M., Ent. Branch, Dept. Agric., Ottawa.
Tams, W. H. T., Midnapore, Alta.
Taverner, P. A., Victoria Memorial Museum, Ottawa.
Tothill, J. D., Fredericton, N.B.

Treherne, R. C., Agassiz, B.C.
Venables, E. P., Vernon, B.C.
Walker, Dr. E. M., Univ. of Toronto, Toronto.
Wallis, J. B., 265 Langside St., Winnipeg, Man.
Whitehouse, F. C., Red Deer, Alta.
Willing, Prof. T. N., Univ. of Saskatchewan, Saskatoon, Sask.
Wilson, Tom, 1105 Broadway, Vancouver, B.C.
Winn, A. F., 32 Springfield Ave., Westmount, Que.
Young, C. H., Victoria Memorial Museum, Ottawa.

NOTES OF CAPTURES.

(Species preceded by an asterisk (*) described during 1915.)

Lepidoptera.

(Arranged according to Dyar's List of North American Lepidoptera, U.S. Nat. Museum Bull. No. 52.)

(Dyar's number.)

Papilionidæ.

16. *Papilio machaon* var. *aliaska* Scudd. Fort Chipewyan, Alberta, June 18, 1914, (F. Harper).

Sphingidæ.

730. *Smerinthus cerisyi* Kirby. Murray Bay, Que., July, (J. H. Holmes). Rare in Quebec Province. In Winn's list only two localities given—Cowansville and Montreal, (Gibson).

Saturniidæ.

766. *Pseudohazis hera* Harr. Recently I received a specimen of this species taken at Lillooet, B.C., (Phair). It is almost a perfect match to the specimen figured by Strecker on Plate XV of his Lepidoptera, Rhopaloceres and Heteroceres. Mr. Phair reported that he has only found the species where there is sage bush. Mr. Tom Wilson has also taken the insect at the same place. These are the first records I have for British Columbia, (Gibson).

Arctiidæ.

861. *Phragmatobia assimilans* Walk., var. *franconia* Slosson. Several at light, on Pine Creek, near Millarville, Alta., April 29, (Dod and Tams).
883. *Apantesis quenselii* Paykull. 141 Meridian, north of Mount Natazhat, July 1, 1913, (E. W. Nesham).
889. *Apantesis williamsii determinata* Neum. St. Agath, Que., June 25, 1910, (L. Gibb).

Noctuidæ.

996. *Apatela manitoba* Sm. Kaslo, B.C., (Cockle). First record from British Columbia.

1049. *Arsilonche henrici* Grt. Lethbridge, Alta., (Strickland). Rare in Alberta; the North American representative of European *albovenosa* (Dod).

Perigia albimacula B. & McD. Kaslo, B.C., (Cockle).

1145. *Hillia vigilans* Grt. Red Deer, Alta., Sept. 2, (Whitehouse and Tams).

1212. *Hadena passer* var. *incallida,* Walk. Lethbridge, Alta., (Strickland). This is the form with the ground colour pale ochreous. It has often passed in collections as *morna* Strk., (Dod).

1266. *Polia contacta* Walk. Kaslo, B.C., (Cockle).

1271. *Polia acutissima* Grt. Red Deer, Alta., Sept. 3, (Whitehouse and Tams). This is a prior name for *medialis* Grt. As it happens, the type of *acutissima* has the t.a. and the t.p. lines more deeply dentate than type *medialis.* The species has often been recorded from the West under the name of *confragosa* Morr., the correctness of which cannot at present be ascertained, (Dod).

1277. *Dryobota illocata* Walk. Red Deer, Alta., Sept. 4, (Whitehouse and Tams). New to Alberta, (Dod).

1297. *Heliotropha reniformis* Grt. Pine Creek, near Millarville, Alta., Aug. 27, (Tams). First record for this district, (Dod).

1324. *Oncocnemis hayesi* Grt. Kaslo, B.C., (Cockle).

Oncocnemis poliochroa Hamps. Kaslo, B.C., (Cockle).

1329. *Oncocnemis tenuifascia* Sm. Kaslo, B.C., (Cockle).

1331. *Oncocnemis levis* Grt. Lethbridge, Alta., (Strickland). Very rare in Canada, previously taken in the same locality by Mr. Wallis.

1339. *Oncocnemis riparia* Morr. Lethbridge, Alta., (Strickland).

Noctua dislocata Sm. Pine Creek, near Millarville, Alta., June 27, (Brill and Tams). Mr. Tams has prepared mounts of the genitalia of this and *calgary* and finds them very distinct. Those of *dislocata* are exactly like those of British *conflua,* whilst superficially *conflua* is much nearer to *calgary* than to *dislocata,* (Dod).

1483. *Noctua jucunda* Walk. St. John's, Que., (W. Chagnon). Only one record, "Meach Lake," in Winn's Quebec list. This latter is about 170 miles distant from St. John's, (Gibson).

1492. *Noctua patefacta* Sm. Lethbridge, Alta., (Strickland).

* *Rhizagrotis querula* Dod. Red Deer River, about 50 miles to the north-east of Gleichen, Alta., July 1, 3, 1915; July, 23, 24, 1907, (Hudson and Dod). Can. Ent. XLVII, 36.. Recorded in 1906 and 1907 Ent. Records as *lagena.*

1535. *Feltia robustior* Sm. Lethbridge, Alta., (Strickland). First Alberta Record, (Dod).

1547. *Feltia vancouverensis* Grt. Pine Creek, near Millarville, Alta., June 24, (Tams). This species has rarely been met with before from east of the Rockies, one or two only having been recorded from Alberta. Mr. Strickland has found it not uncommon at Lethbridge. As a rule, there is less contrast between the light and dark shades than in Vancouver Island specimens, the dark shades being paler and less purplish and the ground colour decidedly darker, but occasional specimens from the two localities are almost exactly alike, (Dod).

Euxoa (*Rhizagrotis*) *perolivalis* Sm. Lethbridge, Alta., (Strickland). This species was referred to *Rhizagrotis* by Smith, by reason of the male antennæ being ciliate merely. The character does not appear to be quite constant, and one of the Lethbridge males has the antennæ more obviously serrate than any I had before seen, (Dod).

Euxoa pestula Sm. Lethbridge, Alta., (Strickland). This species is very close indeed to *pleuritica* Grt., and may be a dark form of it, (Dod).

Euxoa thanatologia var. *sordida* Sm. Lethbridge, Alta., (Strickland). Breeding results, in conjunction with a study of Kaslo, B.C., material and previous examination of type, has convinced me that *boretha* Sm. and *sordida* Sm. are both forms of one extraordinarily variable species previously described as *Porosagrotis thanatologia* by Dyar, but best referred to *Chorizagrotis* Smith, which Hampson treats as merely a section of *Euxoa*, (Dod).

1589. *Euxoa sponsa* Sm. Kaslo, B.C., (Cockle).

1590. *Euxoa choris* var. *cogitans* Sm. Lethbridge, Alta., (Strickland).

1593. *Euxoa hollemani* Grt. Maple Bay, Vancouver Island, B.C., Aug. 24, (Day).

1672. *Euxoa pallipennis* Sm. (Syn. *alcosta* Sm.). Lethbridge, Alta., Aug. 21, 1914, (Strickland). A new Canadian record, (Dod).

1689. *Euxoa holoberba* Sm. Kaslo, B.C., (Cockle).

1801. *Mamestra trifolii* Rott. Lethbridge, Alta., Aug. 20, 1914, (Strickland). A new Alberta record, all previous records being my *mutata*, which Hampson claims is a *Cardepia*, very close to *nova* Sm., (Dod).

1849. *Mamestra segregata* Sm. Bow River, at the mouth of Fish Creek, Alta., April 17-24, (Tams). Pine Creek, near Millarville, Alta., April 1, (Dod), and May 8 (Tams). *Segregata* was described from Laggan. *Gussata* Sm. described from here, appears to be a synonym of this, and *negussa* Sm., also described from here a variety without the blackish markings. The species is very variable, the forms easily intergrading, and an examination of male genitalia gives no evidence suggesting two species, (Dod).

2021. *Graphiphora uniformis* Sm. Lethbridge, Alta., (Strickland). The first Alberta record. This species has usually stood as *furfurata* or *peredia* in Manitoba collections. The two latter names refer to one species, very closely allied to *uniformis* (Dod).

2031. *Graphiphora præses* Grt. Kaslo, B.C., (Cockle). Not in Dyar's Kootenai list.

2048. *Stretchia muricina* Grt. Midnapore, Alta., April 12, 16, 28, May 12, (Dod and Tams). I have previously recorded the form occurring here as *plusiæformis*, but whilst I have not so far recognized a distinct species under that name, I consider it probable that all Alberta and British Columbia specimens which I have seen are *muricina*, (Dod).

2067. *Cleoceris populi* Strk. Lethbridge, Alta., (Strickland).

Xylina vivida Dyar. Kaslo, B.C., (Cockle). Not in the Kootenai list.

2079. *Xylina petulca* Grt. Kaslo, B.C., (Cockle). Not in the Kootenai list.

2093. *Xylina ferrealis* Grt. Kaslo, B.C., (Cockle). Not in the Kootenai list.

2095. *Xylina innominata* Sm. Red Deer, Alta., Aug. 30, and Sept. 4, (Whitehouse and Tams). New to Alberta (Dod).

2113. *Xylina capax* G. and R. Blackfalds, Alta., Aug. 17-24, (Whitehouse). New to Alberta, (Dod).

2121. *Calocampa curvimacula* Morr. Kaslo, B.C., (Cockle). Recorded in B.C. list from Vancouver Island.

* *Papaipema humuli* Bird. Cartwright, Man.; Can. Ent. XLVII, 112.

2175. *Papaipema harrisii* Grt. Midnapore, Alta., bred from larvæ found in flower and leaf stems of *Heracleum lanatum,* emerged Aug. 18—Sept. 1, (Dod and Tams). This is the No. 368 of my Alberta list, formerly recorded as *impecuniosa* on Smith's authority. It was a great surprise to discover some numbers of the larvæ feeding close to my house, after I had been on the look out for it for years (Dod).

2205. *Conservula anodonta* Gn. Bondville, Que., July 20, (Winn). Rare in Quebec Province; only two localities given in Winn's list—St. Margaret and Meach Lake, (Gibson).

Orthosia aggressa Sm. Lethbridge, Alta., (Strickland). The first Alberta record. Described from Colorado and Cartwright, Man. Very close to *puta* Grt. (Syn. *euroa* Grt. and *dusca* Sm.), for a large specimen of which it might easily be taken. Its distinction is not unquestionable, (Dod).

2244. *Scopelosoma devia* Grt. Kaslo, B.C., (Cockle). Not in Dyar's Kootenai list.

2262. *Ipimorpha subvexa* Grt. Lethbridge, Alta., (Strickland). The first Alberta record. Recorded in last year's Record from Moose Jaw, Sask., (Dod).

2288. *Nycterophæta luna* Morr. Lethbridge, Alta., (Strickland).

2289. *Copablepharon grandis* Morr. Lethbridge, Alta., (Strickland).

2307. *Rhodophora florida* Gn. Lethbridge, Alta., (Strickland). First Alberta record, (Dod).

Autographa sansoni Dod. Kaslo, B.C., (Cockle). New to B.C. list.

2529. *Autographa snowi* Hy. Edw. Pine Creek, near Millarville, Alta., July 21, (Tams).

2846. *Catocala pura* Hulst. Red Deer and Blackfalds, Alta., Aug. 17 to Sept. 6, (Tams and Whitehouse). The species is very closely allied to *unijuga,* which occurs with it, but *pura* is more variable. It seems probable that *semirelicta* Grt. is the same species, though I am in doubt as to what exact forms the two names apply. According to Smith's catalogue, Grote repeatedly referred Hulst's name to his *semirelicta,* whilst Hulst persisted that the latter was a variety of *briseis.* Pale specimens of the latter are not unlike some forms of *pura,* (Dod).

2851. *Catocala mariana* Hy. Edw. Peachland, B.C., Aug. 6, 10, 1912, (Wallis). Dr. McDunnough informs me that as *mariana* is preoccupied in Europe, *edwardsi* Kuz. will have to be used instead, (Gibson).

3006. *Erebus odora* L. Although this southern species has previously been recorded from Quebec Province (Metis, Quebec, Montreal and Meach Lake), it is of interest to record the capture of a specimen at Newport, Gaspe Co., Que., Aug. 15, by Mrs. G. Chapados. The specimen was donated to the collection of the Ent. Branch by the collector through Miss J. McInnes (Gibson).

3072. *Bomolocha toreuta* Grt. Agassiz, B.C., Aug. 1 (Treherne).

Notodontidæ.

3150. *Schizura semirufescens* Walk. Agassiz, B.C., Aug. 1-15, (Treherne).

Geometridæ.

3236. *Nyctobia nigroangulata* Strk. Red Deer, Alta., April 18, (Whitehouse).

* *Hydriomena speciosata* var. *ameliata* Swett. Victoria, B.C., July 7, 9, 1914. (Blackmore); Can. Ent. XLVII, 64.

3387. *Hydriomena nubilifasciata* var. *cupidata* Swett. Quamichan district, B.C., May 22, 1914, new to B.C. list. Identified by Mr. Swett, who stated that this is a rare variety and rather unexpected from British Columbia. He had only seen the variety from California, (Day).

* *Hydriomena grandis* var. *saawichata* Swett. Victoria, B.C., May 5 to June 20, 1914, (Blackmore); Can. Ent. XLVII, 157.

3393. *Hydriomena edenata* Swett. Mt. Tzouhalem, B.C., Apl. 5, (Hanham).

3401. *Hydriomena multiferata* Walk. Midnapore, Alta. (de Mille's Lumber Mill), July 13, (Brill and Tams).

* *Stammodes blackmorei* Swett. Victoria, B.C., July 2-27, 1913; July 3, 1914, (Blackmore); Can. Ent., XLVII, 155.

* *Petrophora defensaria* var. *mephistaria* Swett. Victoria, B.C., Jan. 9, 1909; Ladysmith, B.C., Feb. 3, 1906, (C. Livingston); Victoria, B.C., (Blackmore); Can. Ent. XLVII, 156.

3450. *Xanthorhoe abrasaria* H.-S. Midnapore, Alta. (de Mille's Lumber Mill), July 13, (Brill and Tams).

3605. *Orthofidonia exornata* Walk. Pine Creek, near Millarville, Alta., May 6, (Tams).

3784. *Alcis sulphuraria* Pack. Lethbridge, Alta., (Strickland). The only previous Alberta record was one taken at Midnapore and recorded in the 1914 Ent. Record, (Dod).

3804. *Spodolepis substriaria* Hulst. Pine Creek, near Millarville, Alta., April 29, (Dod).

3867. *Lycia cognataria* Gn. Quamichan Lake, B.C., April 2, (Hanham).

3963. *Euchlœna astylusaria* Walk. Pine Creek, near Millarville, Alta., May 31, (Tams).

3976. *Synaxis pallulata* Hulst. Quamichan Lake, B.C., Sept. 15, (Hanham).

4016. *Sabulodes lorata* Grt. Lethbridge, Alta., (Strickland); only one specimen previously recorded from Alberta, (Dod).

4026. *Sabulodes transversata* Dru. Lethbridge, Alta., (Strickland). New to Alberta, (Dod).

4040. *Leucobrephos brephoides* Walk. Klutlan Glacier, elev. 5,500 feet, (141 Meridian, north of Mt. Natazhat), May 2, 1913, (E. W. Nesham). Mr. Dod tells me that this insect was common in 1915 on Pine Creek, near Millarville, Alta., April 7-10, (Tams), flying in sunshine, (A. G.).

Tortricidæ.

5207. *Episimus argutanus* Clem. Aweme, Man., reared from *Rhus toxicodendron*, (N. Criddle).

5367. *Archips negundana* Dyar. Aweme, Man., July 8, 1914, (N. Criddle).

5396. *Tortrix pallorana* Rob. Aweme, Man., July 16, 1914, (N. Criddle).

Yponomeutidæ.

5491. *Trachoma falciferella* Walsm. Quamichan Lake, B.C., March 21, the second I have captured, (Hanham).

Gelechiidæ.

Recurvaria nanella Hbn. Toronto, Ont., reared from pear, (Cosens), Bridgetown, N.S., July 30, (Sanders).

* *Gnorimoschema gibsoniella* Busck. Aweme, Man., (N. Criddle); Proc. Ent. Soc. Wash. XVII, 82.

Elachistidæ.

* *Coleophora manitoba* Busck. Aweme, Man., (N. Criddle); Proc. Ent. Soc. Wash., XVII, 88.

6179. *Walshia amorphella* Clem. Aweme, Man., July 25, 1914, (N. Criddle).

Tineidæ.

* *Incurvaria itoniella* Busck. Kaslo, B.C., (Cockle); Proc. Ent. Soc. Wash., XVII, 92.

COLEOPTERA.

(Arranged according to Henshaw's list of Coleoptera of America, North of Mexico.)

Cicindelidæ.

18c. *Cicindela longilabris* var. *montana* Lec. Athabaska Landing, Alta., Aug. 11, (Strickland).

34. *Cicindela pusilla* Say. Estevan, Sask., June 20, (N. Criddle).

Carabidæ.

408. *Bembidium dubitans* Lec. Vernon, B.C., April 10, (Ruhmann).

416. *Bembidium mutatum* G. & H. Agassiz, B.C., (Treherne).

422. *Bembidium trechiforme* Lec. Agassiz, B.C., (Treherne).

* *Trechus borealis* Schaeffer. Labrador, Battle Harbor, (Engelhardt); Bay of St. George, Newfoundland, (Engelhardt). Jour. N.Y. Ent. Soc. XXIII, 47.

510. *Pterostichus brunneus* Dej. Armstrong, B. C., Sept. 12, (Ruhmann).

558. *Pterostichus scitulus* Lec. Vernon, B.C., July, 1914, (Ruhmann).

571. *Pterostichus corvinus* Dej. Winnipeg, Man., April 29, 1911, (Wallis).

578. *Pterostichus mutus* Say. Winnipeg, Man., June 10, 1910, (Wallis).

643. *Amara adstrictus* Putz. Miami, Man., Aug. 14, 1914, (Wallis).

749. *Calathus advena* Lec. Vernon, B.C., Aug. 1914, (Ruhmann).

750. *Calathus impunctatus* Say. Husavick, Man., Aug. 2, 1912, (Wallis).

776. *Calathus piceolus* Lec. Winnipeg, Man., May 3, 1911, (Wallis).

818. *Platynus cupreus* Dej. Agassiz, B.C., (Treherne).

1067. *Discoderus parallelus* Hald. Peachland, B.C., July 24, 1912, (Wallis).

1084. *Harpalus faunus* Say. Winnipeg, Man., June 18, 1911, (Wallis).

1087b. *Harpalus longior* Kirby. Winnipeg, Man., June 2, 1911, (Wallis).

1090. *Harpalus fulvilabris* Mann. Winnipeg, Man., June 1, 1912, (Wallis).

1096. *Harpalus ventralis* Lec. Treesbank, Man., July 26, 1910; Miami, Man., July 1, 1914, (Wallis).

1106. *Harpalus lewisii* Lec. Miami, Man., July 21, 1914, (Wallis).

Amphizoidæ.

1215. *Amphizoa insolens* Lec. Peachland, B.C., July 13, 1912, (Wallis).

Staphylinidæ.

2124. *Staphylinus badipes* Lec. St. Rose, Que., April 22, 1914, (Beaulne).
* *Philonthus pumilio* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 431, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus nematocerus* Casey. Metlakatla, B.C., (Keen); Memoirs on the Coleoptera, VI, 437, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus ottawensis* Casey. Ottawa, Ont., (Harrington); Memoirs on the Coleoptera, VI, 438, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus cephalicus* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 438, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus linearis* Casey. Metlakatla, B.C., (Keen); Memoirs on the Coleoptera, VI, 439, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus vulgatus* Casey. Ottawa; Memoirs on the Coleoptera, VI, 442, by Thos. L. Casey, issued Nov. 27, 1915.
* *Philonthus finitimus* Casey. Hull, Que., (Beaulne); Memoirs on the Coleoptera, VI, 443, by Thos. L. Casey, issued Nov. 27, 1915.
* *Megaquedius manitobensis* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 423, by Thos. L. Casey, issued Nov. 27, 1915.
* *Quediochrus quadriceps* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 421, by Thos. L. Casey, issued Nov. 27, 1915.
* *Microsaurus curtipennis* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 414, by Thos. L. Casey, issued Nov. 27, 1915.
* *Microsaurus breviceps* Casey. Stikine River, B.C., (Wickham); Memoirs on the Coleoptera, VI, 411, by Thos. L. Casey, issued Nov. 27, 1915.
* *Microsaurus criddlei* Casey. Aweme, Man., (N. Criddle); Memoirs on the the Coleoptera, VI, 410, by Thos. L. Casey, issued Nov. 27, 1915.
* *Microsaurus canadensis* Casey. Kazubazua, Que., (Beaulne); Memoirs on the Coleoptera, VI, 409, by Thos. L. Casey, issued Nov. 27, 1915.
* *Distichalius oculens* Casey. Inverness, B.C., (Keen); Memoirs on the Coleoptera, VI, 407, by Thos. L. Casey, issued Nov. 27, 1915.
* *Distichalius agnatus* Casey. Aweme, Man., (N. Criddle); Memoirs on the Coleoptera, VI, 406, by Thos. L. Casey, issued Nov. 27, 1915.
Orus punctatus Casey. Agassiz, B.C., (Treherne).
2501. *Hesperobium californicum* Lec. Agassiz, B.C., (Treherne).
2863. *Anthobium pothos* Mann. Ottawa, Ont., May, 13, (Germain).

Phalacridæ.

3007. *Olibrus nitidus* Melsh. Ottawa, Ont., May 31, (Germain).

Corylophidæ.

Orthoperus brunneus Casey. Ottawa, May, (Germain).

Coccinellidæ.

Anatis lecontei Casey. Lethbridge, Alta., July 27, (Strickland).
3089. *Pentilia marginata* Lec. Ottawa, Ont., June 17, (Germain).

Corydiidæ.

3281. *Deretaphrus oregonensis* Horn. Peachland, B.C., July 13, 1912, (Wallis).

Cucujidæ.

3348. *Dendrophagus glaber* Lec. Bird's Hill, Man., May 6, 1911, (Wallis).

Cryptophagidæ.

3363. *Paramecosoma serratum* Gyll. Ottawa, Ont., June 27, 1914, (Germain).
3443. *Trogoderma tarsale* Melsh. Ottawa, Ont., July 12, 1914, (Germain).

Histeridæ.

3495. *Hister furtivus* Lec. Millarville, Alta., April, May, 1914, (Tams).
3533. *Epierus regularis* Beauv. Ottawa, Ont., July 3, (Germain).
3552. *Paromalus æqualis* Say. Husavick, Man., June 22, 1912; under debris on lake beach, (N. Criddle and Wallis).
3586a. *Saprinus distinguendos* Mars. Winnipeg, Man., June 1, 1912, (Wallis).
3588. *Saprinus infaustus* Lec. Peachland, B.C., July 19, 1912, (Wallis). Dr. Fall when determining the specimen stated that probably this beetle is the one that Horn mentions in his Synopsis as possibly a form of *infaustus*.
3602. *Saprinus incertus* Lec. Peachland, B.C., July 22, 1912, (Wallis).
3610. *Saprinus fimbriatus* Lec. Peachland, B.C., July 22, 1912, (Wallis).

Elateridæ.

4115. *Cardiophorus amplicollis* Mots. Grand Forks, B.C., 1913, (Ruhmann).
4252. *Drasterius livens* Lec. Grand Forks, B.C., 1913, (Ruhmann).
4415. *Paranomus estriatus* Lec. Ottawa, Ont., June 25, (Germain).

Throscidæ.

4548. *Throscus invisus* Horn. Ottawa, Ont., June 17, (Germain).

Buprestidæ.

10,112. *Agrilus masculinus* Horn. Aweme, Man., June 5, (N. Criddle).

Lampyridæ.

4914. *Silas munita* Lec. Vernon, B.C., April 8, (Ruhmann).

Malachidæ.

5030. *Malachius ulkei* Horn. Aweme, Man., May 31, (N. Criddle).

Ptinidæ.

Ptinus villiger Reit. Winnipeg, Man., May 17, 1911, (Wallis).
10,149. *Xestobium elegans* Horn. Winnipeg, Man., May 23, 1911, (Wallis).
5265. *Oligomerus obtusus* Lec. Ottawa, Ont., June 25, (Germain).

Scarabæidæ.

5439. *Canthon perplexus* Lec. Macleod, Alta., June 30, 1902, (J. Fletcher).
5510. *Aphodius hamatus* Say. Quebec, Que., (Roy).

5629. *Trox scaber* L. Miami, Man., July 1, 1914, (Wallis).

5648. *Hoplia laticollis* Lec. Aweme, Man., July, 1903 to 1910, (Criddle Bros.). First Canadian record we have.

Serica intermixta Blatchley. Aweme, Man., May 26, 1910, (E. Criddle).

5686. *Serica anthracina* Lec. Vernon, B.C., April 8, (Ruhmann).

5705. *Diplotaxis obscura* Lec. Aweme, Man., April, May, (Criddle Bros.).

Lachnosterna grandis Smith. Halifax, N.S., July 18, (Perrin). It is also interesting to record the capture of a specimen on Sable Island. A single specimen was received at Ottawa with a small collection of lepidoptera. Sable Island is about 140 miles due east of Guysborough County in Nova Scotia.

* *Anomala* (subq. *Paranomala*) *canadensis* Casey. Ontario, Canada; Memoirs on the Coleoptera, VI, 33, by Thos. L. Casey, issued Nov. 27, 1915.

* *Cremastocheilus pocularis* Casey. Aweme, Man., (Criddle); Memoirs on the Coleoptera, VI, 33, by Thos. L. Casey, issued Nov. 27, 1913.

Cerambycidæ.

5973. *Nothorhina aspera* Lec. Peachland, B.C., July 12, 1912, (Wallis).

6201. *Neoclytus erythrocephalus* Fab. Miami, Man., July 2, 1914, (Wallis).

6252. *Anthophylax viridis* Lec. Halifax, N.S., Aug. 22, (Perrin).

6259. *Acmæops bivittata* Say. Miami, Man., July 3, (Wallis).

6304. *Leptura subhamata* Rand. Halifax, N.S., Aug. 21, (Perrin).

6332a. *Leptura erythroptera* Kirby. Halifax, N.S., Aug. 22, (Perrin).

Chrysomelidæ.

6531. *Donacia porosicollis* Lec. Onah, Man., May 24, 1912, in flowers of Marsh Marigold, (S. and E. Criddle and Wallis).

6535. *Donacia distincta* Lec. Ottawa, Ont., July, 1913, (Germain).

6538. *Donacia pubescens* Lec. Winnipeg, Man., June 22, 1912, (Wallis).

6539. *Donacia æqualis* Say. Ottawa, Ont., July, 1913, (Germain).

6541. *Donacia emarginata* Kirby. Ottawa, Ont., July, 1913, (Germain).

6545. *Donacia metallica* Ahr. Ottawa, Ont., July, 1913, (Germain).

6550. *Donacia atra* var. *childreni* Kirby. Winnipeg, Man., May 28, 1911, (Wallis). The same collector has also taken at Winnipeg the varieties *tibialis* (June 29) and *trivittata* (June 17).

10,337. *Syneta hamata* Horn. Vernon, B.C., April 9, (Ruhmann).

* *Pachybrachys relictus* Fall. Toronto, Ont.; Trans. Amer. Ent. Soc., XLI, 424.

* *Pachybrachys carborarius janus* Fall. Brandon, Man.; Trans. Amer. Ent. Soc., XLI, 462.

Pachybrachys elegans Blatchley. Winnipeg, Man., June 24, 1911, (Wallis).

Tymnes canellus var. *thoracica* Melsh. Winnipeg, Man., June 24, 1911, (Wallis).

6769. *Graphops marcassita* Cr. Winnipeg, Man., (Wallis); Ottawa, Ont., May 25, (Germain).

6809a. *Chrysomela spirææ* Say. Treesbank, Man., April 17, 1908, (Wallis).

6905. *Galerucella nymphææ* L. Fort Chipewyan, Alta., June 13, (F. Harper).

6920. *Hypolampis pilosa* Ill. Winnipeg Beach, Man., Aug. 25, 1910, (Wallis).

6974. *Haltica tombacina* Mann. Ottawa, Ont., May 25, (Germain).

Bruchidæ.

7135. *Bruchus aureolus* Horn. Aweme, Man., July 6, (N. Criddle).

Tenebrionidæ.

Eleodes letcheri var. *vandykei* Blaisd. Vernon, B.C., April 8, (Ruhmann).
7355. *Eleodes cordata* var *rotundipenne* Lec. Vernon, B.C., April 8, (Ruhmann).
7391. *Nyctobates pennsylvanica* DeG. Winnipeg, Man., May 5, 1911, (Wallis).
Arrhenoplita bicornis Oliv. Ottawa, Ont., May and June, (Germain).

Cistelidæ.

7631. *Androchirus erythropus* Kirby. Ottawa, Ont., July 21 (Germain).

Melandryidæ.

7653. *Melandrya striata* Say. Winnipeg, Man., June 19, 1912, (Wallis).
7655. *Emmesa labiata* Say. Quebec, Que., (Roy).
7658. *Xylita lævigata* Hellw. Ottawa, Ont., Aug., 1914, (Germain).
7663. *Scotochroa atra* Lec. Ottawa, Ont., July 18, 1914, (Germain).
7664. *Scotochroa basalis* Lec. Ottawa, Ont., June 12, (Germain).
7666. *Serropalpus barbatus* Schall. Winnipeg, Man., July, 1909, (Wallis).

Pythidæ.

7708. *Boros unicolor* Say. Winnipeg, Man., June 4, 1914, (Wallis).

Mordellidæ.

7804. *Mordellistena intermixta* Helm. Miami, Man., July 6, 1914, (Wallis).

Anthicidæ.

Stereopalpus vestitus Say. Ottawa, Ont., July 14, (German).

Pyrochroidæ.

7997. *Dendroides ephemeroides* Mann. Agassiz, B.C., June 20, (Treherne).

Otiorhynchidæ.

8261. *Panscopus erinaceus* Say. Ottawa, Ont., July 3, (Germain).
8285. *Otiorhynchus rugifrons* Gyll. Ottawa, Ont., July 1, (Germain).
8293. *Mylacus saccatus* Lec. Vernon, B.C., April 10, (Ruhmann).

Curculionidæ.

8673. *Orchestes pallicornis* Say. Ottawa, Ont., July 29, (Germain).
8688. *Proctorus decipiens* Lec. Ottawa, Ont., June 3, (Germain).
Cœliodes apicalis Dietz. Ottawa, Ont., June 29, (Germain).

Scolytidæ.

* *Pityogenes hopkinsi* Swaine. "In limbs of pine throughout eastern part of Canada and United States"; Tech. Publication No. 2, N.Y. State College of Forestry, Vol. XVI, 7.

- * *Ips perroti* Swaine. Isle Perrot, Que., 1912, (Swaine); Can. Ent., XLVII, 357.
- * *Dryocœtes sechelti* Swaine. Sechelt, B.C., Can. Ent., XLVII, 359.
- * *Dryocœtes piceæ* Hopk. "North Carolina to Canada, and westward to Michigan"; Rep. No. 99, U. S. Dep. Agr., Office of the Secretary, p. 51, issued March 10, 1915.
- * *Dryocœtes pseudotsugæ* Swaine. Inverness and Vancouver, B.C., Can. Ent., XLVII, 360.
- * *Phlœosinus pini* Swaine. Riding Mts., Man., (Swaine); Can. Ent. XLVII, 362.
- * *Hylastes ruber* Swaine. Golden, B.C., Creighton Valley, B.C., Can. Ent., XLVII, 367.
- * *Conophthorus resinosæ* Hopk. "Ontario, Canada," (Harrington); Jour. Wash. Acad. Sci., Vol. V, 431.
- * *Conophthorus monticolæ* Hopk. "Cowitche Lake, Canada," Jour. Wash. Acad. Sci., Vol. V, 432. The locality should be corrected to read "Cowitchan Lake, B.C."

DIPTERA.

(Arranged according to a catalogue of North American Diptera, by J. M. Aldrich, Smithsonian Misc. Coll. XLVI, No. 1, 444. The numbers refer to the pages in the catalogue.)

Large collections of these insects have been made in certain of the provinces during 1915. The appearance of Winn and Beaulieu's list of Quebec diptera will doubtless encourage collectors in that province to add to the list. Recently we had the pleasure, at Ottawa, of a visit from Prof. J. M. Aldrich, who came to study the collection of diptera in the collection of the Entomological Branch. Many species were determined by him, and the records of a number of these are undoubtedly new to Canada.

Tipulidæ.

- * *Dicranomyia aquita* Dietz. Described in Can. Ent. XLVII, 331. The type localities there given, viz.: "Fort Resolution, Aug. 24, 1914; Island at mouth of Rocker River, Aug. 16, 1914, (F. Harper)" were tentative ones, I am informed by Mr. Harper, and should be corrected to read, "District of Mackenzie along the south shore of Great Slave Lake," (Gibson).
- * *Limnobia gracilis* Dietz. Described in Can. Ent. XLVII, 329. The type locality there given, viz.: "Tsolinoi, about 5 miles north of Athabaska Lake, July 5, 1914, (F. Harper)," should be corrected to read, Tsal-wor Lake, Sask., about 8 miles from the north shore of Lake Athabaska at a point about midway of its length, (Gibson).
- * *Gonomyia mathesoni* Alex. Truro, N.S., July 7-26, 1913, (R. Matheson); Ent. News, XXVI, 170.
- * *Limnophila* (*Dactylolabis*) *hortensia* Alex. London Hill Mine, Bear Lake, B.C., July 29, 1903, (A. N. Caudell); Proc. Acad. Nat. Sciences, Philadelphia, LXVI, 591.
- * *Phalacrocera neoxena* Alex. Nipigon, Ont., June 17, 1913, (Walker). Proc. Acad. Nat. Sciences, Philadelphia, LXVI, 603.

100. *Tipula augustipennis* Loew. Vernon, B.C., (Ruhmann); Athabaska River, between Grand Rapids and mouth of Little Buffalo River, Alta., May 24, 25, 1914, (F. Harper).
104. *Tipula serta* Loew. Soulier Lake, southern Mackenzie, July 18-22, 1914, (F. Harper).
104. *Tipula tessellata* Loew. Lake Athabaska, near mouth of Charlot River, northern Saskatchewan, June 29, 1914, (F. Harper).

Chironomidæ.

108. *Ceratopogon cockerelli* Coq. Banff, Alta., Aug. 29, 1910, (Sanson).

Culicidæ.

132. *Grabhamia curriei* Coq. Banff, Alta., June 26, 1909, (Sanson).

Cecidomyidæ.

* *Dasyneura torontoensis* Felt. Toronto, Ont., May 3, 1915, (Cosens); Jour. Econ. Ent. 8, 405.

Bibionidæ.

164. *Plecia heteroptera* Say. DeGrassi Point, Lake Simcoe, Ont., Aug. 26, 1914, (Walker).
166. *Bibio nervosus* Loew. Vernon, B.C., (Ruhmann).
166. *Bibio nigripilus* Loew. Ottawa, Ont., May and June, (Germain).
166. *Bibio obscurus* Loew. Banff, Alta., Sept. 29, 1911, (Sanson).
166. *Bibio xanthopus* Wied. Ottawa, Ont., June 18, (Germain).
167. *Dilophus serraticollis* Walk. Banff, Alta., Sept. 29, 1911, (Sanson).
167. *Aspistes analis* Kirby. Banff, Alta., (Sanson.)
168. *Scatopse pygmæa* Loew. Ottawa, Ont., May 30, (Germain); Toronto, Ont., June 7, 1914, (Walker).

Simuliidæ.

169. *Simulium bracteatum* Coq. Ottawa, Ont., May 12, (Germain).
170. *Simulium vittatum* Zett. Ottawa, Ont., May 5, (Germain).

Stratiomyidæ.

179. *Sargus decorus* Say. Departure Bay, B.C., July 25, 1913, (Walker); Toronto, Ont., May 4, June 11, 1914, (Walker).
180. *Sargus viridis* Say. Spruce Brook, Nfd., July 29, 1914, (Walker).
182. *Stratiomyia discalis* Loew. Kelowna, B.C., June 2, 1914 (Ruhmann).
183. *Stratiomyia lativentris* Loew. Prince Albert, Sask., June 26, 1913, (Walker).
183. *Stratiomyia nymphis* Walk. Banff, Alta., Aug. 5, 1909, (Sanson).
184. *Stratiomyia normula* Loew. Prince Albert, Sask., June 29, 1913, (Walker).

Tabanidæ.

194. *Pangonia-tranquilla* O. S. Halifax, N.S., Aug. 20, 22, (Perrin).
195. *Chrysops callidus* O. S. Toronto, Ont., June 30, 1914, (Walker).
195. *Chrysops celer* O. S. Prince Albert, Sask., June 23, 1912, (Walker); Spruce Brook, Nfd., July 27, 1914, (Walker).
196. *Chrysops carborarius* Walk. Toronto, Ont., June 7, 1914, (Walker).

196. *Chrysops frigidus* O. S. Spruce Brook, Nfd., July 29, 1914, (Walker).
197. *Chrysops montanus* O. S. Ottawa, Ont., May 20, (Germain).
197. *Chrysops niger* Macq. Spruce Brook, Nfd., July 27, 1914, (Walker); Toronto, Ont., June 13, 1914, (Walker).
197. *Chrysops plangens* Wied. MacNab's Island, Halifax, N.S., July 19, 1914, (Perrin).
201. *Tabanus astutus* O. S. MacNab's Island, Halifax, N.S., Aug. 16, 1914, (Perrin).

Tabanus centron Marten. Fort McMurray, Alta., May 29; Fort Chipewan, June 16-18, (F. Harper).

Tabanus fulvescens Walk. MacNab's Island, Halifax, N.S., Aug. 2, 1914, (Perrin).

208. *Tabanus stygius* Say. Pt. Pelee, Ont., July 19, 1913, (Taverner and Young).

Leptidæ.

Arthropeas magna Jns. Calgary, Alta., (J. Fletcher); Aweme, Man., June 20, 1903, (N. Criddle).

212. *Rhachicerus nitidus* Jns. Lake McGregor, Que., July 12, (Germain). New to Quebec Province.
214. *Triptotricha disparilis* Bergr. Agassiz, B.C., Aug., (Treherne).
214. *Leptis maculifer* Bigot. Vancouver, B.C., June, 1914, (Chrystal).
215. *Leptis plumbea* Say. Jordan, Ont., May 10, (Ross).
215. *Leptis scapularis* Loew. Bowmanville, Ont., July 10, 1913, (Ross); Lake McGregor, Que., July 12, (Germain).
216. *Chrysopila ornata* Say. Jordan, Ont., June 16, (Ross).
216. *Chrysopila proxima* Walk. Toronto, Ont., June 13, 1914, (Walker).
217. *Symphoromyia atripes* Bigot. Banff, Alta., (Sanson); Lake Louise, Alta., July 20, (Ruhmann).
217. *Symphoromyia hirta* Jns. Prince Albert, Sask., July 24, 28, 1907, (J. Fletcher).

* *Symphoromyia kincaidi* Aldrich. Victoria, B.C., Aug. 6, 1903, (Kincaid); Gabriola Island, B.C., May 30, 1908, B. Elliott, (Kincaid); Stickeen River Canyon, B.C., (Wickham); Proc. U. S. N. M. Vol. 49, 129.

* *Symphoromyia montana* Aldrich. Prince Albert, Sask., May 18, 1905, (Willing); Ungava Bay, (Turner); Farewell Creek, Sask., (C. W. J.); Proc. U. S. N. M. Vol. 49, 133.

217. *Symphoromyia plangens* Will. Elbert, B.C., June 19, 1914, (Chrystal).

Nemestrinidæ.

219. *Rhynchocephalus sackeni* Will. Vernon, B.C., June 23, 1902.

Bombyliidæ.

223. *Spogostylum pluto* Wied. De Grassi Point, Lake Simcoe, Ont., Aug. 14, 1895, (Walker).
230. *Anthrax fulviana* Say. De Grassi Point, Lake Simcoe, Ont., Aug. 28, 1914, (Walker).
230. *Anthrax fulviana* var. *nigricauda* Loew. Banff, Alta., July 25, 1910, (Sanson).
236. *Bombylius lancifer* O. S. Kelowna, B.C., June 2, 1914, (Ruhmann).

Therevidæ.

247. *Psilocephala munda* Loew. Banff, Alta., July 16, 1909, (Sanson).
248. *Thereva flavicincta* Loew. St. Johns, Que., Record from Stettiner Entomologische Zeitung, 1912, p. 261. New to Quebec list.

Mydaidæ.

251. *Mydas clavatus* Dru. Pt. Pelee, Ont., July 19, 1913, (Taverner and Young).

Asilidæ.

254. *Leptogaster badius* Loew. Jordan, Ont., June 29, (Ross).
Laphystia flavipes Coq. Aweme, Man., July 13, 1907, (J. Fletcher).
258. *Myelaphus lobicornis* O. S. Invermere, B.C., June 30, 1914, (Sladen).
259. *Cyrtopogon dasyllis* Will. Banff, Alta., (Sanson).
260. *Cyrtopogon nebulo* O. S. Banff, Alta., March 6, 1911, (Sanson).
269. *Atomosia puella* Wied. Jordan, Ont., Jan. 29, (Ross).
271. *Dasyllus columbica* Walk. Banff, Alta., June 30, 1913, (Walker).
271. *Dasyllis thoracica* Fabr. De Grassi Point, Lake Simcoe, Ont., July 2, 1896, (Walker).
272. *Laphria pubescens* Will. Sudbury, Ont., June 7, 1913, (Walker).
273. *Laphria vultur* O. S. Kaslo, B.C., June, (Cockle).
281. *Tolmerus callidus* Will. Banff, Alta., July 11, 1911, (Sanson).
282. *Tolmerus notatus* Wied. De Grassi Point, Lake Simcoe, Ont., Aug. 23, 1914, (Walker).
282. *Asilus annulatus* Will. Toronto, Ont., Aug. 8, 1914, (Walker).
283. *Asilus orphne* Walk. Lake McGregor, Que., July 23, (Germain).
283. *Asilus paropus* Walk. Jordan, Ont., Aug. 6, 1914, (Ross).

Dolicopodidæ.

285. *Psilopodinus patibulatus* Say. Lake Louise, Alta., July 4, 1914, (Ruhmann).
289. *Chrysotus obliquus* Loew. Bridgetown, N.S., Aug. 29, 1912, (Sanders).
291. *Argyra albicans* Loew. Toronto, Ont., June 13, 1914, (Walker).
293. *Sympycnus lineatus* Loew. Brockville, Ont., Aug. 23, 1903, (W. Metcalfe).
296. *Medeterus veles* Loew. Aweme, Man., June 12, (N. Criddle).
* *Thrypticus comosus* Van Duzee. Toronto, Ont., July 4; Psyche, XXII, 86.
299. *Dolichopus bifractus* Loew. Aweme, Man., July 6, (N. Criddle); Dauphin, Man., June 22, 1913, (Walker).
300. *Dolichopus brevipennis* Meigen. Summerside, P.E.I., Aug. 21, 1914, (Walker).
301. *Dolichopus cuprinus* Wied. Dauphin, Man., June 22, 1913, (Walker).
301. *Dolichopus dakotensis* Ald. Dauphin, Man., June 22, 1913, (Walker).
301. *Dolichopus eudactylus* Loew. Jordan, Ont., June 12, (Ross).
304. *Dolichopus reflectus* Ald. Jordan, Ont., July 8, (Ross).
304. *Dolichopus renidescens* M. & B. Dauphin, Man., June 22, 1913, (Walker).
306. *Gymnopternus tristis* Loew. Vancouver, B.C., June 30, 1914, (Chrystal).

Empidæ.

311. *Drapetis medetera* Melan. Aweme, Man., Sept. 21, (N. Criddle).
311. *Platypalpus æqualis* Loew. Ottawa, Ont., June 18, (Germain).
312. *Platypalpus crassifemoris* Fitch. Aweme, Man., July 20, (N. Criddle).

313. *Tachydromia pusilla* Loew. Ottawa, Ont., May and June, (Germain).
318. *Syneches thoracicus* Say. Lake McGregor, Que., July 12, (Germain). New to Quebec Province.
319. *Leptopeza compta* Coq. Ottawa, Ont., July 16, (Germain).
319. *Ocydromia glabricula* Fallen. Aylmer, Que., June, (Germain). New to Quebec Province.
326. *Hilara tristis* Loew. Spruce Brook, Nfd., July 27, 1914, (Walker).
331. *Rhamphomyia irregularis* Loew. Ottawa, Ont., July 3, (Germain).
331. *Rhamphomyia lævigata* Loew. Ottawa, Ont., July 3, (Germain).
331. *Rhamphomyia longicauda* Loew. Toronto, Ont., July 12, 1914, (Walker).
332. *Rhamphomyia pulla* Loew. Toronto, Ont., May 31, 1914, (Walker).
Microsania imperfecta Loew. Aweme, Man., Sept. 18, (Criddle).

Phoridæ.

339. *Gymnophora arcuata* Meigen. Ottawa, Ont., July and August, (Germain).

Platypezidæ.

340. *Agathomyia notata* Loew. Ottawa, Ont., June 27, (Germain).

Pipunculidæ.

342. *Chalarus spurius* Fallen. Ottawa, Ont., July 20, (Germain).
Pipunculus appendiculatus Cr. Aweme, Man., July 6, (N. Criddle).
343. *Pipunculus albofasciatus* Hough. Ottawa, Ont., May and June, (Germain).
343. *Pipunculus cingulatus* Loew. Ottawa, Ont., May and June, (Germain).
Pipunculus confraternus Banks. Aweme, Man., July 23, (N. Criddle).
343. *Pipunculus flavomaculatus* Hough. Ottawa, Ont., May and June, (Germain).

Syrphidæ.

346. *Microdon tristis* Loew. Field, B.C., July 1, 1908, (J. C. Bradley); Vineland, Ont., June 4. (Ross and Curran).
348. *Chrysotoxum ventricosum* Loew. Revelstoke, B.C., July 8-13, 1905, (J. C. Bradley).
348. *Chrysogaster bellula* Will. Vineland, Ont., Aug. 18, 1914, (Ross and Curran).
349. *Chrysogaster stigmata* Will. Carbonate to Prairie Hills, Selkirk Mts., B.C., July 12-18., 1909, (Bradley).
349. *Pipiza albipilosa* Will. Ottawa, Ont., July 3, (Germain).
350. *Pipiza calcarata* Loew. Vineland, Ont., May and June, (Ross).
350. *Pipiza femoralis* Loew. Toronto, Ont., June 6, 1914, (Walker); Vineland, Ont., May and June, (Ross and Curran).
350. *Pipiza pistica* Will. Vineland, Ont., July 10, (Ross and Curran).
350. *Pipiza pisticoides* Will. Vineland, Ont., May 11, (Ross and Curran).
350. *Pipiza pulchella* Will. Ottawa, Ont., July 3, (Germain).
Eumerus strigatus Fall. Victoria, B.C., reared from Narcissus bulbs, April 7-9, 1910, (E. A. Wallace).
351. *Paragus angustifrons* Loew. Revelstoke, B.C., July 1, 1905, (J. C. Bradley).

351. *Paragus tibialis* Fall. Vineland, Ont., July 17-Aug. 6; also reared from larvæ feeding on *Aphis gossypii,* (Ross and Curran).
352. *Chilosia lasiophthalmus* Will. Carbonate to Prairie Hills, Selkirk Mts., B.C., July 12-18, 1908, (J. C. Bradley); Wellington, B.C., April 16, 1903, (R. V. Harvey).
353. *Chilosia tristis* Loew. Carbonate on Columbia River, July 7-12, 1908, (J. C. Bradley).
359. *Pyrophæna rosarum* Fabr. Ottawa, Ont., June 27, (Germain).
359. *Platychirus peltatus* Meigen. Carbonate to Prairie Hills, Selkirk Mts., July 12-18, 1908, (J. C. Bradley).
359. *Platychirus hyperboreus* Stæger. Vineland, Ont., (Ross and Curran), Bowmanville, Ont., (Ross).
360. *Melanostoma obscurum* Say. Vineland, Ont., May and June, (Ross and Curran).
362. *Leucozona lucorum* Linné. Metlakatla, B.C., (Keen).
362. *Didea fasciata* Macq. Vineland, Ont., May 10, (Ross and Curran).
362. *Didea fasciata* var. *fuscipes* Loew. Carbonate, B.C., July 7-12, 1908, (J. C. Bradley); Macnab's Island, Halifax, N.S., July 4, 1914, (Perrin).
363. *Didea laxa* O. S. Halifax, N.S., June 27, (Perrin).
364. *Syrphus amalopis* O. S. Banff, Alta., June 24, 1911, (Sanson).
365. *Syrphus geniculatus* Macq. Spruce Brook, Nfd., July 29, 1914, (Walker); Ground Hog Basin, Bend Country, Selkirk Mts., B.C., Aug. 4, 1905, (J. C. Bradley); Ottawa, Ont., May 3, (Germain).
366. *Syrphus grossulariæ* Meigen. Carbonate, Columbia River, B.C., July 7-12, 1908, (J. C. Bradley).
367. *Syrphus opinator* O. S. Ground Hog Basin, Selkirk Mts., Aug. 4, 1905, (J. C. Bradley).

Syrphus perplexus Osb. Toronto, Ont., May 30, 1909, (M. C. VanDuzee).

368. *Syrphus torvus* O. S. Spruce Brook, Nfd., July 27, 1914, (Walker).
368. *Syrphus umbellatarum* Fabr. Spruce Brook, Nfd., July 27, 1914, (Walker).
368. *Syrphus velutinus* Will. Ground Hog Basin, Big Bend Country, Selkirk Mts., B.C., July 24, 1905, (J. C. Bradley).
368. *Syrphus xanthostoma* Will. Vineland, Ont., May 17, (Ross and Curran).
371. *Xanthogramma polita* Say. Vineland, Ont., Sept. 8, (Ross and Curran).
373. *Sphærophoria scripta* L. Ottawa, Ont., April 20, (Germain). Mr. C. W. Johnson. when naming this specimen, stated: "This is the true *S. scripta;* although long recorded from America, I have not seen it before."
374. *Sphegina campanulata* Rob. Vineland, Ont., July 9, (Ross and Curran).
374. *Sphegina infuscata* Loew. Ground Hog Basin, Selkirk Mts., B.C., Aug. 4, 1905, July 24, 1908; Carbonate, Columbia River, B.C., July 7-12, 1908, (J. C. Bradley).
374. *Sphegina lobata* Loew. Ground Hog Basin, B.C., July 24, 1905, Aug. 4, 1905, (J. C. Bradley).
375. *Neoascia distincta* Will. Ottawa, Ont., May 13, (Germain).
375. *Neoascia globosa* Walk. Carbonate, B.C., July 7-12, 1908, (J. C. Bradley).
378. *Volucella esuriens mexicana* Macq. Victoria, B.C., April 15, 1905, (Hanham).
378. *Volucella fascialis* Will. Midnapore, Alta., June 15, (Tams); Invermere, B.C., June 30, 1911, (Sladen).

382. *Sericomyia chalcopyga* Loew. Spruce Brook, Nfd., June 29, 1914, (Walker).

383. *Arctophila flagrans* O. S. Rogers Pass, B.C., Aug. 1, 1908; Ground Hog Basin, B.C., July 22-Aug. 7, 1905, (J. C. Bradley); Vernon, B.C., (Ruhmann).

Eristalis arbustorum L. Ottawa, Ont., May 5, (Germain). St. John, N.B., (G. P. Engelhardt); Labrador, Battle Harbor, (G. P. Engelhardt). A European species. Jour. N.Y. Ent. Soc. XXIII, 143.

385. *Eristalis compactus* Walk. Halifax, N.S., July 11, (Perrin).

386. *Eristalis flavipes* Walk. Vineland, Ont., April 27, Sept. 16, (Ross and Curran).

386. *Eristalis hirtus* Loew. Agassiz, B.C., July, (Treherne).

386. *Eristalis inornatus* Loew. Mt. Cheam, B.C., July 22, (Treherne).

387. *Eristalis montanus* Will. Leduc, Alta., (J. Fletcher).

Eristalis nemorum, L. Vernon, B.C., Aug. 31, 1904, (R. V. Harvey); Kaslo, B.C., July 11; Revelstoke, B.C., July 14, (R. C. Osburn); Kaslo, B.C., May 7, 1910, (Cockle); Montreal, Que., Sept. 1, 1905, (Beaulieu). A European species—Jour. N.Y. Ent. Soc., XXIII, 144.

Eristalis rupium Fab. Atlin, B.C., (Anderson). A European species—Jour. N.Y. Ent. Soc., XXIII, 143.

393. *Helophilus hamatus* Loew. Aweme, Man., Aug. 25, (J. Fletcher); Vineland, Ont., Aug. 18, (Ross and Curran).

393. *Heliophilus lætus* Loew. Carlsbad Springs, Ont., June 1, 1903, (Gibson); Vineland, Ont., June 6, (Ross and Curran).

393. *Heliophilus latifrons* Loew. Vineland, Ont., Aug. 28 to mid-October, (Ross and Curran).

396. *Triodonta curvipes* Wied. Quebec, Que., (Roy). New to Quebec Province.

398. *Xylota angustiventris* Loew. Vineland, Ont., July 13, (Ross and Curran).

398. *Xylota anthreas* Walk. Vineland, Ont., June 14, July 2, (Ross and Curran.

398. *Xylota barbata* Loew. Kaslo, B.C., May 21, (Cockle).

398. *Xylota chalybea* Wied. Vineland, Ont., June 24, 29, (Ross and Curran).

398. *Xylota curvipes* Loew. Vineland, Ont., June 12, (Ross and Curran). Recorded from Ottawa.

399. *Xylota notha* Will. Vineland, Ont., June 24, (Ross and Curran).

Xylota segnis L. Macnab's Island, Halifax, N.S., July 4, 1914, (Perrin). A European species not heretofore reported from North America. See Verrall, British Flies, VIII, 598, for description and figure, (J. M. A.).

400. *Xylota vecors* O. S. Spruce Brook, Nfd., July 29, 1914, (Walker).

401. *Crioprora cyanella* O. S. Kaslo,, B.C., (July 20, (Cockle).

402. *Criorhina intersistens* Walk. Ground Hog Basin, B.C., July 24, 1905, (J. C. Bradley).

403. *Criorhina scitula* Will. Ground Hog Basin, B.C., Aug. 4, 1905, (J. C. Bradley).

403. *Criorhina umbratilis* Will. Spruce Brook, Nfd., July 28, 1914, (Walker).

404. *Spilomyia fusca* Loew. Ottawa, Ont., Aug. 1, 1906, (J. Fletcher).

404. *Spilomyia interrupta* Will. Similkameen, B.C., Sept. 12, 1913, (Wilson).

404. *Sphecomyia brevicornis* O. S. Duncan, B.C., May 10, 1908, (Hanham).

Sphecomyia occidentalis Osb. Ground Hog Basin, B.C., July 22-Aug. 7, 1905, (J. C. Bradley). Only specimen known, I understand, except unique type.

405. *Temnostoma æqualis* Loew. Spruce Brook, Nfd., June 29, 1914, (Walker).

Conopidæ.

409. *Physocephala tibialis* Say. De Grassi Point, Lake Simcoe, Ont., July 11, 1895, (Walker).
412. *Oncomyia loraria* Loew. Ottawa, Ont., July 28, (Germain); Jordon, Ont., July 9, 1914, (Ross).
412. *Myopa clausa* Loew. Halifax, N.S., July 26, (Perrin).
412. *Myopa versiculosa* Say. Ottawa, Ont., May 20, 1915, (Germain).

Œstridæ.

419. *Cuterebra scutellaris* Brauer. Peachland, B.C., July, 1902, (A. H. Huston).

Tachinidæ.

423. *Phorantha occidentis* Walk. Aweme, Man., July 6, 13, (N. Criddle); Ottawa, Ont., June 3, (Germain).
424. *Alophora pulverea* Coq. Ottawa, Ont., June, (Germain).
433. *Hypostena flaveola* Coq. Simcoe, Ont., (Caesar).
434. *Hypostena floridensis* Tns. Ottawa, Ont., July 10, 1914. (Beaulieu).
442. *Besseria brevipennis* Loew. Lethbridge, Alta., June 26, 1914, (Strickland).
451. *Ocyptera carolinæ* Desv. De Grassi Point, Lake Simcoe, Ont., July 19, 1895; Toronto, Ont., June 13, 1895, (Walker).
451. *Ocyptera dosiades* Walk. Jordon, Ont., July 28, 1914, (Ross); Prince Albert, Sask.; June 23, 1913, (Walker).
453. *Gymnochæta alcedo* Loew. Vernon, B.C., (Ruhmann).
458. *Exorista nigripalpis* Tns. Pincher, Alta., July 18, 1913, (Strickland).
482. *Microphthalma disjuncta* Wied. Aweme, Man., July 10-21, (N. Criddle).
Trixosceles fumipennis Mall. Aweme, Man., July 23, (N. Criddle).
460. *Phorocera doryphoræ* Riley. Grimsby and Vineland, Ont., (Caesar).
Dichætoneura leucoptera Jns. Simcoe and Guelph, Ont., reared from *Archips cerasivorana*, July 22-Aug. 12, 1912, (Caesar).
484. *Peleteria ænea* Stæger. Pincher, Alta., July 18, 1913, (Strickland).
488. *Echinomyia dakotensis* Tns. Vernon, B.C., (Ruhmann).
* *Saskatchewania canadensis* Smith. Farewell Creek, Sask., June, Aug. and Sept., 1907; Can. Ent., XLVII, 153.

Sarcophagidæ.

510. *Sarcophaga assidua* Walk. Ottawa, Ont., Aug., 1915, (Germain).
511. *Sarcophaga cimbicis* Tns. Ottawa, Ont., Aug. 14, 1912, (Beaulne); Regina, Sask., June 12, 1903, (Willing); Guelph, Ont., (Sanders); Port Hope, May 30, 1907, (W. Metcalfe).
Sarcophaga hæmorrhoidalis Mg. Ottawa, Ont., Sept. 4, 1908, (H. Groh).
512. *Sarcophaga helicis* Tns. Ottawa, Ont., June 30, 1912, (Beaulne).
Agria affinis Fall. Victoria, B.C., reared from *Vanessa antiopa*, (J. R. Anderson).

Miltogrammidæ.

* *Arabiopsis cocklei* Tns. London Hill Mine, Bear Lake, B.C., July 21, 1903, (Cockle); Can. Ent. XLVII, 285.

Salmaciidæ.

* *Knabia hirsuta* Tns. Oxbow, Sask., April 30, May 13, 1907, (F. Knab); Can. Ent. XLVII, 287.

Larvævoridæ.

* *Okanagania hirta* Tns. Okanagan Falls, B.C., April 27, 1913, (E. M. Anderson); Can. Ent., XLVII, 290.

* *Panzeriopsis curriei* Tns. London Hill Mine, Bear Lake, B.C., July 21-29, 1913, (R. P. Currie); Can. Ent., XLVII, 291.

* *Rhachogaster kermodei* Tns. Penticton, B.C., July 4, 8, 1913, (E. M. Anderson); Can. Ent. XLVII, 291.

Minthoidæ.

* *Pseudodidyma pullula* Tns. Victoria, B.C., April 2, 1906, (E. M. Anderson); Can. Ent., XLVII, 288.

518. *Cynomyia cadaverina* Desv. Vernon, B.C., (Ruhmann).

527. *Mesembrina latreillei* Desv. Agassiz, B.C., July, 1915, (Treherne).

Hypodermodes solitaria Knab. Agassiz, B.C., Aug., (Treherne). Described in Can. Ent., Sept., 1910, from Alberta and Montana.

Anthomyidæ.

539. *Fannia serena* Fall. Ottawa, Ont., June 27, (Germain).

547. *Limnophora diaphana* Wied. Ottawa, Ont., June 3, (Germain).

550. *Anthomyia pluvialis* L. Ottawa, Ont., May 13, (Germain).

552. *Hylemyia lipsia* Walk. Ottawa, Ont., May 3, (Germain).

553. *Eustalomyia vittipes* Zett. Ottawa, Ont., July 14, (Germain).

557. *Phorbia latipennis* Zett. Lake Athabaska, near mouth of Charlot River, Northern Saskatchewan, June 29, 1914, (F. Harper).

558. *Pegomyia calyptrata* Zett. Ottawa, Ont., May 13, (Germain).

563. *Schœnomyza dorsalis* Loew. Aweme, Man., Sept. 18-21, (N. Criddle).

Scatophagidæ.

565. *Cordylura adusta* Loew. Ottawa, Ont., April 27, (Germain).

566. *Cordylura volucricaput* Walk. Ottawa, Ont., June 18, (Germain).

566. *Parallelomma varipes* Walk. De Grassi Point, Lake Simcoe, Ont., July 10, 1895, (Walker).

567. *Hydromyza confluens* Loew. Ottawa, Ont., June 15, (Germain).

Heteroneuridæ.

Clusia czernyi Jns. Ottawa, Ont., July 12, (Germain).

Helomyzidæ.

572. *Helomyza longipennis* Loew. Spruce Brook, Nfd., July 28, 1914, (Walker).

572. *Anorostoma marginata* Loew. Ottawa, Ont., June 27, (Germain).

572. *Scoliocentra helvola* Loew. Ottawa, Ont., July 14, (Germain).

Sciomyzidæ.

578. *Sciomyza pubera* Loew. Ottawa, Ont., July 14, (Germain).
578. *Neuroctena anilis* Fall. Ottawa, Ont., June 3, (Germain).
580. *Tetanocera valida* Loew. De Grassi Point, Lake Simcoe, Ont., Aug. 26, 1914, (Walker).
581. *Sepedon fuscipennis* Loew. Spruce Brook, Nfd., July 29, 1914, (Walker).
581. *Sepedon pusillus* Loew. De Grassi Point, Lake Simcoe, Ont., Aug. 26, 1914, (Walker).

Sapromyzidæ.

Lonchæa laticornis Mg. Banff, Alta., Aug. 29, 1911, (Sanson).
582. *Lonchæa rufitarsis* Macq. Toronto, Ont., May 13, 1914, (Walker).
582. *Palloptera jucunda* Loew. Inverness, B.C., July, 1910, (J. H. Keen).
582. *Palloptera superba* Loew. Ottawa, Ont., June 21, 1904, (W. Metcalfe).
585. *Sapromyza decora* Loew. Ottawa, Ont., Aug. 11, 1909, (W. Metcalfe).
587. *Sapromyza vulgaris* Fitch. Ottawa, Ont., June, (Germain); Aweme, Man., July 13, (N. Criddle).

Ortalidæ.

587. *Pyrgota chagnoni* Jns. Ottawa, Ont., May 16, (Germain).
589. *Rivellia flavimanus* Loew. Toronto, Ont., May 30, 1896; June 6, 1914. (Walker).
589. *Rivellia viridulans* Desv. Toronto, Ont., June 19, 1895; Dauphin, Man., June 22, 1913, (Walker).
592. *Tephronota narytia* Walk. Aweme, Man., July 23, (N. Criddle).
597. *Chætopsis massyla* Walk. Aweme, Man., Sept. 7, (N. Criddle).

Trypetidæ.

603. *Acidia fratria* Loew. Toronto, Ont., June 8, 1914, (Walker).
604. *Spilographa electa* Say. Smith's Cove, N.S., July 15, 1914, (Gibson).
604. *Spilographa setosa* Doane. Reared from hips of *Rosa nutkana* collected at Cowichan Lake, B.C., Sept. 18, 1906, by J. Fletcher; emerged at Ottawa, Ont., June 25, 1907, (Gibson).
605. *Trypeta occidentalis* Snow. Larvæ destroying seeds of *Cirsium drummondii* at Elphinstone, Man., collected by W. A. Burman; adults reared, (Gibson).
Rhagoletis fausta O. S. Victoria B.C., June 19, 1907, (R. M. Palmer).
607. *Rhagoletis rubicola* Doane. Aweme, Man., July 3, (J. Fletcher and N. Criddle).
611. *Tephritis albiceps* Loew. Ottawa, Ont., July 1, 1914, (Beaulne).
611. *Tephrites clathrata* Loew. Aweme, Man., Sept. 18, (N. Criddle).
613. *Urellia aldrichii* Doane. Aweme, Man., Oct. 4, (N. Criddle).

Micropezidæ.

616. *Calobata alesia* Walk. Ottawa, Ont., June 27, (Germain).
616. *Calobata antennipes* Say. Toronto, Ont., June 13, 1895, (Walker).
617. *Calobata univitta* Walk. Ottawa, Ont., June 15, (Germain); Toronto, Ont., June 11, 1914, (Walker).

Psilidæ.

621. *Loxocera collaris* Loew. Ottawa, Ont., June 20, (Germain).

Ephydridæ.

623. *Dichæta caudata* Fall. Ottawa, Ont., June 3, (Germain).
623. *Notiphila bella* Loew. Ottawa, Ont., May 27, (Germain).
623. *Notiphila carinata* Loew. Toronto, Ont., June 13, 1914, (Walker).
Psilopa compta Mg. Aweme, Man., Oct. 14, (N. Criddle).
627. *Hydrellia obscuriceps* Loew. Brockville, Ont., Sept. 20, 1903, (W. Metcalfe); Ottawa, Ont., Aug. 28, 1908, (J. Fletcher).
627. *Philygria opposita* Loew. Ottawa, Ont., July 28, (Germain); Aweme, Man., July 23, (N. Criddle).
628. *Ochthera mantis* DeG. Lake McGregor, Que., July 12, (Germain). New to Quebec Province.
628. *Pelina truncatula* Loew. Aweme, Man., Oct. 17, (N. Criddle).
629. *Parydra bituberculata* Loew. Ottawa, Ont., July 3, (Germain); Ottawa, July 21, Aug. 6, 1914, (Beaulieu); Toronto, Ont., June 13, 1914, (Walker).
629. *Ephydra atrovirens* Loew. Ottawa, Ont., June, July, (Germain).
630. *Scatella oscitans* Walk. Aweme, Man., Oct. 14, (N. Criddle).
630. *Scatella stagnalis* Fall. Bridgetown, N.S., Aug. 29, 1912, (Sanders); Port Hope, Ont., May 24, 1897, (Metcalfe); Aweme, Man., Sept. 7, Oct. 14, 17, (N. Criddle).

Oscinidæ.

Meromyza flavipalpis Mall. Aweme, Man., July 20, (N. Criddle).
Meromyza marginata Beck. Beaver River, Alta., Aug. 20, (Strickland).
632. *Anthracophaga maculosa* Loew. Montreal, Que. Record from Becker's Mon. of Chloropidæ IV, 1912, p. 44.
632. *Anthracophaga eucera* Loew. Brockville, Ont., Aug. 23, 1903, (Metcalfe); Bridgetown, N.S., Aug. 29, (Sanders).
Chlorops seminigra Becker. Type locality, Montreal, Que. Described in Becker's Monograph of Chloropidæ, IV, 66, 1912.
633. *Diplotoxa microcera* Loew. Aweme, Man., July 2, (N. Criddle).
633. *Diplotoxa versicolor* Loew. Aweme, Man., June 25, (N. Criddle).
Chlorops stigmata Becker. Type locality, Vancouver Island, B.C., (Livingston). Described in Becker's Monograph of Chloropidæ, IV, 60, 1912.
Chlorops integra Becker. Aweme, Man., July 20, Aug. 8, (N. Criddle).
Chlorops rufescens Coq. Ottawa, Ont., July 4, (Beaulne).
Chloropisca clypeata Mall. Regina, Sask., June 18, 1904, (J. Fletcher); Ottawa, Ont., June 24, 1904, (W. Metcalfe).
633. *Chloropisca obscuricornis* Loew. Aweme, Man., July 23, (N. Criddle).
Chloropisca obtusa Mall. Ottawa, Ont., July 17, 1904, (W. Metcalfe).
634. *Chloropisca variceps* Loew. Athabaska, Alta., Edmonton, Alta., Aug. 10, (Strickland); Prince Albert, Sask., July 28, 1907, (J. Fletcher).
635. *Eurina exilis* Coq. De Grassi Point, Lake Simcoe, Ont., Aug. 26, 1914, (Walker).
635. *Hippelates flavipes* Loew. Aweme, Man., Sept. 16, (N. Criddle).
Hippelates pallipes Loew. Aweme, Man., June 12, (N. Criddle).

636. *Elachiptera costata* Loew. Ottawa, Ont., May 27, 1905; Chelsea, Que., May 27, 1905; Carlsbad Springs, Ont., June 26, (W. Metcalfe).
638. *Elachiptera decipiens* Loew. Aweme, Man., Oct. 17, (N. Criddle).
636. *Elachiptera longula* Loew. Aweme, Man., July 6, (N. Criddle).
Mosillus subsultans Fab. Aweme, Man., Aug., Sept., (N. Criddle).
637. *Siphonella oscinina* Fall. Brockville, Ont., Sept. 13, 1903, (W. Metcalfe).
Siphonella parva Ad. Aweme, Man., June 12, (N. Criddle); Ottawa, Aug. 26, 1908, (Fletcher).
638. *Oscinis dorsata* Loew. Aweme, Man., June 6, July 23, Aug. 6, Sept. 7, (N. Criddle).
Oscinis marginalis Mall. Aweme, Man., Aug. 6, (N. Criddle).
Oscinis melanchulica Beck. Aweme, Man., July 23, (N. Criddle).
639. *Oscinis trigramma* Loew. Aweme, Man., Sept. 7, 21, Oct. 10., (N. Criddle).
639. *Oscinis umbrosa* Loew. Aweme, Man., July 13, 23, (N. Criddle).

Drosophilidæ.

641. *Drosophila amœna* Loew. Brockville, Ont., Aug. 12, 1903, (Metcalfe); Ottawa, Ont., June 2, 1878, (Fletcher).

Agromyzidæ.

Phytomyza acuticornis Loew. Aweme, Man., July 13, (N. Criddle).
Phytomyza flava Fall. Aweme, Man., Oct. 12, (N. Criddle).
Cerodonta femoralis Mg. Aweme, Man., Oct. 9-17, (N. Criddle).
647. *Agromyza angulata* Loew. Aweme, Man., Aug. 6, (N. Criddle).
Agromyza coquilletti Mall. Aweme, Man., June 25, (N. Criddle).
Agromyza genualis Mel. Aweme, Man., Oct. 9, (N. Criddle).
648. *Agromyza jucunda* Van der Wulp. Aweme, Man., Oct. 10, (N. Criddle).
Agromyza immaculata Coq. Brockville, Ont., Oct. 25, 1903, (W. Metcalfe); Aweme, Man., Oct. 14, (N. Criddle).
Agromyza laterella Zett. Brockville, Ont., Sept. 13, 1903, (W. Metcalfe).
648. *Agromyza marginata* Loew. Ottawa, Ont., Sept. 1, 1908, (Fletcher); Aylmer, Que., Oct. 20, 1905, (W. Metcalfe). New to Quebec Province.
Agromyza nasuta Mel. Aweme, Man., July 6, (N. Criddle); Montreal, Que., July 11, 1914, (Winn); Port Hope, Ont., May 24, 1897, (W. Metcalfe); Ottawa, Ont., Aug. 26, 1908, (J. Fletcher).
Agromyza scutellata Fall. Aweme, Man., July 20; June 25; (N. Criddle).
649. *Agromyza terminalis* Coq. Dauphin, Man., June 22, 1913, (Walker).
649. *Agromyza vireus* Loew. Ottawa, Ont., Aug. 17, 1907, (J. Fletcher); Brockville, Ont., Aug. 23, 1903, (W. Metcalfe).
Meoneura vagans Fall. Aweme, Man., July 23, (N. Criddle).
649. *Desmometopa latipes* Mg. Aweme, Man., July 6, (N. Criddle).
649. *Desmometopa m-nigrum* Zett. Brockville, Ont., Sept. 20, 1903, (W. Metcalfe).
Desmometopa sordida Fall. Ottawa, Ont., June 1, 1900, (Gibson).
651. *Milichia arcuata* Loew. Ridgeway, Ont., July 23, 1910, (Walker).
Pseudodinia pruinosa Mel. Aweme, Man., Aug. 6, (N. Criddle).
652. *Ochthiphila elegans* Panz. Carlsbad Springs, Ont., June 26, 1904, (W. Metcalfe).
652. *Ochthiphila polystigma* Mg. Aweme, Man., Aug. 6, (N. Criddle).

HYMENOPTERA.

During the year 1915, many specimens in this order were collected in the various provinces in Canada, and some of the interesting captures are here recorded. Species collected in former years have been definitely determined, and some of these, too, we are now able to include. The records of these give further information on their distribution within the Dominion.

Tenthredinidæ.

Strongylogastroidea aprilis Say. Toronto, Ont., June 13, 1895, (Walker).

Parasiobla rufocinctus Nort. Toronto, Ont., June 13, 1895, (Walker).

Dolerus aprilis Nort. Toronto, Ont., June 19, 1907; May 5, 1914, (Walker).

Dolerus cohæsus MacG. Ottawa, Ont., July, 1914, (Germain); Spruce Brook, Nfd., July 27, 1914, (Walker).

Dolerus stugnus MacG. Ottawa, Ont., July, 1914, (Germain).

Dolerus unicolor Beauv. Toronto, Ont., April 19, 1895, (Walker).

Loderus apricus (Nort). Ottawa, Ont., July, 1914, (Germain); Toronto, Ont., June 13, 1914, (Walker).

Tenthredo basilaris Say. De Grassi Point, Lake Simcoe, Ont., Aug. 22, 1914, (Walker).

Macrophya trisyllaba Nort. Toronto, Ont., May 24, 1889, (E. M. Morris); Spruce Brook, Nfd., July 27, 1914, (Walker); Pictou, N.S., July 22, 1914, (Walker).

Cimbex laportei Lep. Dauphin, Man., June 23, 1913, (Walker).

Cimbex 10-maculata Urban. Prince Albert, Sask., June 26, 1913, (Walker).

Gymnonychus appendiculatus Hart. Ottawa, Ont., June 13, 1914, (Germain).

* *Euura cosensii* Rohwer. Toronto, Ont., (Cosens). Proc. U. S. N. M., Vol. 49, 213.

Amauronematus semirufus (Kirby). Ottawa, Ont., Aug. 3, 1913, (Germain).

Pachynematus extensicornis Nort. Ottawa, Ont., Aug. 7, 1914, (Germain); De Grassi Pt., Lake Simcoe, Ont., Aug. 23, 1914, (Walker).

Pristiphora bivittata Nort. Ottawa, Ont., May 22, 1914, (Germain).

Monophadnoides concessus MacG. Ottawa, Ont., Aug. 25, 1914, (Germain).

Cynipidæ.

Callirhytis gemmarius Ash. On island near Hamill's Point, Lake Joseph, Muskoka, Ont., (Cosens). First Canadian record (W. B.).

Andricus clavula O. S. On island near Hamill's Point, Lake Joseph, Muskoka, Ont., (Cosens). First Canadian record (W. B.).

Andricus piger Bass. On island near Hamill's Point, Lake Joseph, Muskoka, Ont., (Cosens). First Canadian record (W. B.).

Andricus ventricosus Bass. On island near Hamill's Point, Lake Joseph, Muskoka, Ont., (Cosens). First Canadian record (W. B.).

* *Diastrophus fragariæ* Beut. Toronto, Ont., (Cosens). Can. Ent., XLVII, 353.

Braconidæ.

Meteorus loxostege Vier. Iron Springs, Alta., May 18, 1914, (Strickland).
Sigalphus bicolor Cr. Grimsby Ont., June 20, 1914, (Walker).
Spathius canadensis Ashm. Toronto, Ont., May 26, 1895, (Walker).

Ichneumonidæ.

Crematus retiniæ Cr. Toronto, Ont., June 13, 1914, (Walker).
Campoplex expertus Cr. Toronto, Ont., June 7-11, 1914, (Walker).
Campoplex vitticollis Nort. Toronto, Ont., June 11, 1914, (Walker).
Thyreodon morio Fab. De Grassi Point, Lake Simcoe, Ont., Aug. 16, 1914, (Walker).
Exochus pallipes Cr. Toronto, Ont., July 12, 1914, (Walker).
Spanotecnus concolor Cr. Toronto, Ont., June 13, 1914, (Walker).
Spanotecnus discolor Cr. St. Catharines, Ont., June 21, 1914, (Walker).
Odontomerus mellipes Say. Toronto, Ont., (Walker).
Megarhyssa nortoni Cr. Pictou, N.S., July 22, 1914, (Walker).
Rhyssa persuasoria Linn. Quebec, Que., (Roy).
Rhyssa albomaculata Cr. Spruce Brook, Nfd., July 29, 1914, (Walker); Edmonton, Alta., (Carr).
* *Pseudorhyssa sternata* Merrill. Toronto, Ont., Aug. 20, 1892. Trans. Amer. Ent. Soc., XLI, 150.
Lissonota superba Prov. Edmonton, Alta., May 22, 1911, (Carr).
Arenetra canadensis Cr. Macleod, Alta., July, 1913, (Strickland).
Lampronota parva Cr. Toronto, Ont., April 19, 1895, (Walker).
Arotes vicinus Cr. Morris Island, Muskoka, Ont., July 30, 1888 (E. M. Morris).
Coleocentrus occidentalis Cr. Departure Bay, B.C., July 5, 1913, (Walker).
Cryptus robustus Cr. De Grassi Point, Lake Simcoe, Ont., Aug. 16, 1914. (Walker).
Ichneumon bimembris Prov. Prince Albert, Sask., (Walker).
Ichneumon canadensis Cr. Spruce Brook, Nfd., July 29, 1914, (Walker); Departure Bay, B.C., July 6, 1913, (Walker).
Ichneumon comes Cr. Morris Island, Muskoka, Ont., July 8, 1888, (E. M. Morris).
Ichneumon cincticornis Cr. Edmonton, Alta., Nov. 10, 1910, (Carr); Prince Albert, Sask., June 26, 1913, (Walker); Toronto, Ont., Aug 8, 1914, (Walker).
Ichneumon cæruleus Cr. Muskoka, Ont., July 30, 1888, (E. M. Morris).
Ichneumon devinctor Say. Edmonton, Alta., April 23, 1910, (Carr).
Ichneumon funestus Cr. Toronto, Ont., Aug. 8, 1914, (Walker).
Ichneumon feralis Cr. Spruce Brook, Nfd., July 27, 1914, (Walker); Edmonton, Alta., (Carr).
Ichneumon flavicornis Cr. Departure Bay, B.C., July 4, 1913, (Walker).
Ichneumon galenus Cr. Toronto, Ont., Aug. 8, 1914, (Walker).
Ichneumon grandis Br. Departure Bay, B.C., July 29, 1913, (Walker).
Ichneumon orpheus Cr. De Grassi Point, Lake Simcoe, Ont., Aug. 16, 1914, (Walker).
Ichneumon pervagus Cr. Morris Island, Muskoka, Ont., (E. M. Morris).
Ichneumon putus Cr. Edmonton, Alta., (Carr).
Ichneumon seminiger Cr. Toronto, Ont., April 12, 1895, (Walker).

Ichneumon suadus Cr. Lake Simcoe, Ont., (Walker).

Ichneumon sublatus Cr. Hamilton, Ont., June 20, 1914, (Walker).

* *Coelichneumon barnstoni* Morley. Hudson Bay, 1884, (Geo. Barnston); Revision of the Ichneumonidæ in the British Museum, Part IV, p. 130.

Amblyteles montanus Cr. Sault Ste. Marie, Ont., June 10, (E. M. Morris).

Amblyteles quebecensis Prov. Departure Bay, B.C., July 7, 1913, (Walker).

Amblyteles stadaconensis Prov. De Grassi Point, Lake Simcoe, (Walker).

Amblyteles subrufus Cr. Sault Ste. Marie, Ont., June 7, 1889, (E. M. Morris).

Amblyteles suturalis Cr. Lethbridge, Alta., July 23, 1914, (Strickland).

Amblyteles tetricus Prov. Toronto, Ont., (Walker).

Trogus fulvipes Cr. Okanagan Landing, B.C., Aug. 16, 1913, (Walker).

Trogus obsidianator Br. De Grassi Point, Lake Simcoe, Ont., Aug. 6, 1895, (Walker).

* *Xenoschensis gracilis* Cushman. Banff, Alta. Proc. Ent. Soc. Wash., XVII, 141.

* *Xenoschensis slossonæ* Cushman. Spruce Brook, Nfd., July 24, 1914, (Walker); Proc. Ent. Soc. Wash., XVII, 140.

Eulophidæ.

Tetrastichus asparagi Cwfd. Vineland, Ont., (Ross).

Formicidæ.

Lasius niger L. var *sitkaensis* Pergande. Treesbank, Man., Sept. 23, (Hewitt).

* *Formica fusca* L. var *algida* Wheeler. Kenora, Ont., (J. C. Bradley); Saguenay River, Que., (Geo. Englehardt); Digby, N.S., (J. Russell); also from Newfoundland and Labrador; Psyche, XXII, 205.

Formica neogagates Em., subsp. *vetula* Wheeler. Banff, Alta., Sept. 16, (Hewitt).

Formica rufa L. subsp. *aggeranus* Wheeler. Banff, Alta., Sept. 16, (Hewitt).

Formica ulkei Em. Treesbank, Man., Sept. 23, (Hewitt).

* *Aphænogaster subterranea borealis* Wheeler. Lardo, Kootenay Lake, B.C., (J. C. Bradley); Bull. Amer. Mus. Nat. Hist., XXXIV, 413.

Psammocharidæ.

* *Ageniella cupidella* Banks. Ridgeway, Ont., Can., July 9, (Van Duzee); Can. Ent., XLVII, 400.

Apidæ.

Osmia armaticeps Cr. Invermere, B.C., female, June 30, 1914, (Sladen); Okanagan Landing, B.C., April 23, 1914, (Wilson).

Osmia quadridentata Cr. Hull, Que., April 25, (Sladen); Toronto, Ont., April 19, 1896, (W. Brodie).

Osmia bucephala Cr. Banff, Alta., May 21, (Sladen); Toronto, Ont., May 6, 1894, (W. Brodie).

Osmia cœrulescens Linn. Ottawa, Ont., May and June, (Sladen); Toronto, Ont., June and July, (W. Brodie). Mr. Sladen considers *purpurea* Cr. to be the same insect known in England as *cœrulescens*.

Osmia lignaria Say. Ottawa, Ont., male, April 5, 23, (Sladen); Golden, Invermere and Sydney, B.C.; Banff, Alta., (Sladen).

Osmia coloradensis Cr. Spulamacheen, B.C., female, Aug., (Wilson); Shawnigan, B.C., July; Revelstoke, B.C., May; Invermere, B.C., May, (Sladen).

Bombus fervidus Fabr. Vernon, B.C., (Venables).

Bombus moderatus Cr. Banff, Alta., (Sanson); Banff, Alta., on *Arctostaphylos uva-ursi,* May 21, (Sladen).

Psithyrus latitarsus Morrill. Aweme, Man., Sept. 16, (N. Criddle).

HEMIPTERA-HETEROPTERA.

(Arranged according to Banks' Catalogue; Amer. Ent. Soc., 1910; the numbers refer to the pages in the catalogue.)

Saldidæ.

12. *Salda humilis* Say. Ottawa, Ont., May and June, 1913 and 1914, (Germain).

12. *Salda littoralis* Linn. Ottawa, Ont., May and June, 1913 and 1914, (Germain).

Reduviidæ.

16. *Zelus luridus* Stal. Bondville, Que., (Moore).

Nabidæ.

22. *Reduviolus propinquns* Reut. Bondville, Que., (Moore).

Capsidæ.

30. *Plagiognathus politus* Uhler. Ottawa, Ont., June 27, 1914, (Germain).
37. *Dicyphus vestitus* Uhler. Ottawa, Ont., July 30, 1914, (Germain).
40. *Resthenia insitiva* Say. Aylmer, Que., Aug. 1914, (Germain).
41. *Miris vicina* Prov. Ottawa, Ont., Aug. 23, (Germain).
44. *Horcias marginalis* Reut. Ottawa, Ont., July 20, 1914, (Germain).
46. *Lygus viticollis* Reut. Ottawa, Ont., May 27, 1914, (Germain).
47. *Phytocoris lasiomerus* Reut. Ottawa, Ont., June, 1914, (Germain).
49. *Stenotus binotatus* Fabr. Ottawa, Ont., Aug. 3, 1914, (Germain).
49. *Pœciloscytus basalis* Reut. Ottawa, Ont., Aug., 1914, (Germain).

Tingitidæ.

56. *Galeatus peckhami* Ashm. Ottawa, Ont., Aug. 1914, (Germain).

Lygæidæ.

58. *Ischnodemus falicus* Say. Ottawa, Ont., July 23, 1914, (Germain).
59. *Crophius disconotus* Say. Ottawa, Ont., July 3, 1914, (Germain).

Pentatomidæ.

86. *Menecles insertus* Say. Quebec, Que., (Roy).

ORTHOPTERA.

Some interesting records of these insects have been received. Considerable collecting in the order has recently been accomplished and our knowledge of the distribution of many of the species considerably widened.

Mantidæ.

Mantis religiosa L. This species known as the European Praying Mantis, and recorded in last year's Entomological Record, has evidently established itself in the Province of Ontario. This year it was again found near Picton, in Hallowell Township, on Oct. 1, (Brimley).

Acridiidæ.

Acrydium obscurum Hanc. Aweme, Man., May 28, Sept. 16, 1915, (Criddle).

Chlöealtis conspersa Harr. Athabaska Landing, Alta., Aug. 11, 1915, (Strickland). Previously reported from Banff, by Walker.

Orphulella speciosa Scudd. Aweme, Man., Aug. 7-17, (E. and N. Criddle).

Chortophaga viridifasciata DeG. Treesbank, Man., June 11, (E. Criddle).

Arphia frigida Scudd. Fort Chipewyan, Alta., June 14, 15, 1914; Fort McMurray, Alta., May 29, 1914, Hill Island Lake, Southern Mackenzie, July 13, 1914, (F. Harper).

Hippiscus tuberculatus Beauv. Fort Chipewyan, Alta., June 15, 1914, (F. Harper).

Trimerotropis monticola Sauss. Aweme, Man., Sept. 16, 1914, (N. Criddle).

Circotettix verruculatus Kirby. Athabaska Landing, Alta., Aug. 11, (Strickland); Island in Tsu Lake, Southern Mackenzie, Aug. 6, 1914; Fort Resolution, Mackenzie, Aug. 24, (F. Harper).

Melanoplus bivittatus Dodge. Athabaska Landing, Alta., Aug. 12, 1915, (Strickland).

Melanoplus bruneri Scudd. Athabaska Landing, Halcourt and Water Hole, Alta., Aug. 11, 12, (Strickland).

Melanoplus fasciatus Walk. Athabaska Landing, Alta., Aug. 11, (Strickland); Fort Resolution, Mackenzie, Aug. 24, 1914, (F. Harper).

Locustidæ.

Scudderia pistillata Brun. Rosedale, Alta., (Miss E. Moodie); St. Louis, Sask., July 25, 1898, (E. Coubeaux); new to Saskatchewan.

Conocephalus fasciatus DeG. Peachland, B.C., Aug. 6, (Wallis).

Udeopsylla nigra Scudd. Oxbow, Sask., July 31, 1897, (W. Noble).

Gryllidæ.

Nemobius fasciatus DeG. Near Souris, P.E.I., Aug. 27, 1915, (A. G. Huntsman).

Œcanthus niveus DeG. Penticton, B.C., Aug. 1908, (Mrs. Fowler).

Œcanthus nigricornis quardipunctatus Beut. Peachland, B.C., Aug. 2-12, (Wallis).

NEUROPTEROID INSECTS (EXCEPT ODONATA).

(Arranged according to a catalogue of the Neuropteroid Insects (except Odonata) of the United States, by Nathan Banks; American Entomological Society, 1907. The numbers refer to the pages of the catalogue.)

CORRODENTIA.

Psocidæ.

7. *Pterodela pedicularis* L. Spruce Brook, Nfd., July 29, 1914, (Walker).
9. *Psocus campestris* Aaron. Toronto, June 30, 1914, (Walker).
9. *Psocus hageni* Bks. Algonquin Park, Ont., Aug. 17, 1903, (Walker).

ARCHIPTERA.

Perlidæ.

10. *Pteronarcys regalis* Newm. Athabaska River, between Grand Rapids and mouth of Little Buffalo River, Alberta, May 24, 25, (F. Harper).
10. *Pteronarcella badia* Hag. Coldwater, B.C., July, 1914, (Wilson).
11. *Isogenus frontalis* Newm. Hymers, Ont., June 19, 1908, (Dawson); Athabaska River, between Grand Rapids and Fort McMurray, Alta., May 28, 1914, (F. Harper); Tazin River, near Tha-inka Lake, Northern Saskatchewan, July 11, (F. Harper).
13. *Isoperla bilineata* Say. Ottawa, Ont., Aug. 13, 1909, (H. Groh); Ottawa, Ont., June 11, 1913, (Beaulne).
13. *Isoperla ebria* Hag. Bartlett Bay, off Glacier Bay, Alaska, June 19, 1907, (D. H. Nelles).
14. *Tæniopteryx frigida* Hag. Hull, Que., May 22, 1904, (W. Metcalfe).
15. *Arsapnia decepta* Banks. Wellington, B.C., March 9, 1907, (G. W. Taylor).

Ephemeridæ.

16. *Ephemera simulans* Walk. Tazin River and Hill Island Lake, Southern Mackenzie, July 14, 1914, (F. Harper).
* *Callibœtis semicostata* Banks. Stony Mt., Man., Sept. 16, (Wallis); Proc. Acad. Nat. Sciences, Philadelphia, LXVI, 614.

NEUROPTERA.

Sialidæ.

22. *Sialis infumata* Newm. Casselman, Ont., May 22, 1904, (J. Fletcher); La Seine River, Rainy River District, Ont., June 30, (W. McInnes).

TRICHOPTERA.

Limnephilidæ.

35. *Neuronia semifasciata* Say. Tsal-wor Lake, about 8 miles north of Lake Athabaska, Northern Saskatchewan, July 5, 1914, (F. Harper).
36. *Glyphotælius hostilis* Hag. Spruce Brook, Nfd., July 29, 1914, (Walker).
Limnephilus bifidus. Lake Athabaska, near mouth of Charlot River, Northern Saskatchewan, June 29, 1914, (F. Harper).
36. *Limnephilus indivisus* Walk. Hamilton, Ont., June 20, 1914, (Walker).
36. *Limnephilus nebulosus* Kirby. Fort Chipewyan, Alta., June 16-18, 1914, (F. Harper).

37. *Anabolia bimaculata* Walk. St. Lawrence River, between Montreal and Quebec (on steamer), July 15-16, 1914, (Walker).
Anabolia nigricula Banks. Fort Resolution, Mackenzie, Aug. 24, 1914, (F. Harper).
38. *Halepsyche indistinctus* Walk. Spruce Brook, Nfd., July 27, 1914, (Walker).
38. *Pycnopsyche guttifer* Walk. De Grassi Pt., Ont., Sept. 22, 1914, (Walker).
39. *Platyphylax designata* Walk. Tazin River, near Tha-inka Lake, Northern Saskatchewan, July 11, 1914, (F. Harper).
40. *Chilostigma difficilis* Walk. Toronto, Nov. 22, 1913, (Walker).

Sericostomatidæ.

42. *Brachycentrus similis* Banks. Athabaska River, above mouth of House River, Alta., May 22, 1914, (F. Harper).

Leptoceridæ.

46. *Leptocella exquisita* Walk. St. Lawrence River near Quebec (on steamer), July 16, 1914, (Walker).
46. *Mystacides sepulchralis* Walk. Sydney, N.S., July 24, 1914; Spruce Brook, Nfd., July 27, 1914, (Walker).
46. *Setodes grandis* Bks. Toronto, June 30, 1914, (Walker).

Hydropsychidæ.

47. *Hydropsyche scalaris* Hag. St. Lawrence River near Quebec (on steamer), July 16, 1914, (Walker).
48. *Nyctiophylax vestitus* Hag. Spruce Brook, Nfd., July 27, 1914, (Walker).

ODONATA.

(Arranged according to Muttkowski's Catalogue of the Odonata of North America. The numbers refer to the pages.)

Coenagrionidæ.

39. *Lestes uncatus* Kirby. Red Deer, Alta., 1915 (Whitehouse). New to Alberta.
48. *Argia moesta putrida* Hag. St. John's, Que., July 11, 1914, (Chagnon).
54. *Enallagma antennatum* Say. St. John's, Que., July 11, 1914, (Chagnon). New to Quebec.
56. *Enallagma carunculatum* Morse. St. John's, Que., July 11, 1914, (Chagnon).
59. *Enallagma ebrium* Hag. St. John's, Que., June 24, 1914, (Chagnon).
59. *Enallagma exsulans* Hag. St. John's, Que., July 11, 1914, (Chagnon). New to Quebec.
85. *Ophiogomphus rupinsulensis* Walsh. St. John's Que., June 22, 1914, (Chagnon).
94. *Gomphus intricatus* Hag. Saskatoon, Sask., July 28, 1910, (Willing). First Canadian record. (Determined by P. P. Calvert.)
114. *Aeshna sitchensis* Hag. Red Deer, Alta., 1915 (Whitehouse).
114. *Aeshna umbrosa* Walk. Red Deer, Alta., 1915, (Whitehouse). New to Alberta.

SIPHONAPTERA.

* *Ceratophyllus ignotus recula* J. and R. Okanagan Landing, B.C., July, 1913, off *Putorius arizonensis,* (J. A. Munro); Okanagan Falls, B.C., April, 1913, off *Thomomys talpoides,* (C. Grant); Kelowna, B.C., Dec. 1910, off *Mustela* sp. (A. Tate); Ectoparasites, 1, 58.

* *Ceratophyllus ignotus albertensis* J. and R. Blackfalds, Alta., collected off *Geomys* sp., *Mustela* sp., and *Lynx canadensis,* (A. D. Gregson); Ectoparasites, 1, 56.

* *Megarthroglossus sicamus* J. and R. Eagle River, Sicamous, B.C., found on *Canis latrans,* Sept. 1903, (G. F. Dippie); Ectoparasites, 1, 50.

* *Megarthroglossus procus* J. and R. Chilliwack, B.C., collected on *Spilogale,* Sept. 1899, and on *Peromyscus,* Dec. 1899, (Allan Brooks); Ectoparasites, 1, 47.

* *Catallagia decipiens* Rothschild. Horse Creek, Upper Columbia Valley, B.C., Oct. 13, 1913, off *Peromyscus,* (G. F. Dippie); Blackfalds, Alta., (A. J. Gregson); Red Deer, Alta., April 25, 1901, off *Evotomys saturatus,* (G. F. Dippie); British Columbia, off *Neotoma cinerea* (W. Wenmann); Ectoparasites, 1, 43.

* *Neopsylla inopina* Rothschild. Calgary, Alta., found on *Spermophilus richardsoni,* April 11, 1907, (C. Garrett); Calgary, Alta., on *Putorius longicaudatus* and *Evotomys saturatus,* (G. F. Dippie); Ectoparasites, 1, 30.

* *Doratopsylla curvata* Rothschild. Blackfalds, Alta., off Kangaroo Mouse and Shrew Mouse, (A. D. Gregson); Ectoparasites, 1, 25.

ARANEIDA.

(Arranged according to Banks' Catalogue of Nearctic Spiders, U. S. N. M., Bulletin 72. The numbers refer to the pages in the catalogue.)

During 1915, collections of spiders have been made in some of the provinces, and also in Labrador, but many of the species have not, as yet, been determined. In 1914, Mr. J. H. Emerton collected in Alberta, and through Mr. N. B. Sanson, of Banff, some of the records are included here. Mr. Sanson has also made collections for several years and recently Mr. Emerton has named these.

Drassidæ.

10. *Drassus coloradensis* Em. Banff, Alta., July 4, 1914, (Sanson).

10. *Drassus neglectus* Keys. Natashkwan, South Labrador, July, (C. W. (Townsend).

Clubionidæ.

* *Clubiona obtusa* Em. Banff, Aug., 1914, (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 153.

Agelenidæ.

15. *Cryphœca montanata* Em. Banff, Alta., Aug. 15, 1914, (J. H. Emerton).

15. *Hahnia agilis* Keys. Old Romaine, South Labrador, July, (C. W. Townsend).

Theridiidæ.

20. *Theridium sexpunctatum* Em. Lake Louise, Alta., Aug. 1914, (J. H. Emerton).
21. *Steatoda borealis* Hentz. Banff, Alta., Aug. 15, 1914, (J. H. Emerton); South Labrador, July, (C. W. Townsend).
26. *Hypselistes florens* Camb. Colpoy's Bay, Ont., Ompah, Ont., (A. B. Klugh).
* *Lophocarenum dentipalpis* Em. Goat Mountain, Jasper, Alberta, (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 149.
* *Lophocarenum erectum* Em. Tackakaw Falls, Yoho Valley, B.C., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 150.
* *Gongylidium tuberosum* Em. Battle Harbor, Labrador, (C. W. Leng); Trans. Conn. Acad. Sci., Vol. 20, 150.
* *Gongylidium canaliculatum* Em. Prince Albert, Sask., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 151.
* *Tmetis reticulatus* Em. Lake Louise, Laggan, Alta., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 148.
* *Tmetis obtusus* Em. Lake Louise, Laggan, Alta.; Jasper, Alta., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 149.

Linyphiidæ.

33. *Linyphia nearctica* Banks. Blanc Sablon, South Labrador, July, (C. W. (Townsend).
33. *Linyphia phrygiana* Koch. Banff, Alta., Aug. 15, 1914, (J. H. Emerton); South Labrador, July, (C. W. Townsend).
* *Bathyphantes arborea* Em. Banff, Alta.; Laggan, Alta.; Yoho Valley, B.C., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 150.
* *Bathyphantes occidentalis* Em. Vancouver, B.C., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 151.
* *Microneta pinnata* Em. Prince Albert, Sask., (J. H. Emerton); Trans. Conn. Acad. Sc., Vol. 20, 152.
* *Microneta flava* Em. Lake Louise, Laggan, Alta., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 152.

Epeiridæ.

* *Singa campestris* Em. Kenora, Ont.; Edmonton, Alta., (J. H. Emerton); Trans. Conn. Acad. Sci., Vol. 20, 153.
41. *Epeira carbonaria* Koch. Laggan, Alta., Aug. 12, 1914, (J. H. Emerton).
41. *Epeira marmorea* Clerck. Banff, Alta., Aug. 27, 1914, (Sanson).

Thomisidæ.

48. *Xysticus ferrugineus* Em. Banff, Alta., July, 1913, (Sanson).
48. *Xysticus triangulosus* Em. Banff, Alta., July, 1913, (Sanson).
49. *Coriarachne brunneipes* Banks. Banff, Alta., Aug., 1914, (Sanson).
51. *Thanatus coloradensis* Keys. Banff, Alta., June, 1912, (Sanson).
52. *Philodromus inquisitor* Thor. Banff, Alta., (Sanson).

Lycosidæ.

55. *Lycosa albohastata* Em. Banff, Alta., (Sanson); Mecatina, South Labrador, July, (C. W. Townsend).
55. *Lycosa beani* Em. Banff, Alta., Sept. 7, 1913, (Sanson).
56. *Lycosa fumosa* Em. Banff, Alta., Sept. 7, 1913, (Sanson).
57. *Lycosa quinaria* Em. Old Romaine, Southern Labrador, July, (C. W. Townsend).
59. *Pardosa gracialis* Thor. Laggan, Alta., Aug. 1914, (J. H. Emerton).
* *Pardosa albiceps* Em. Spray River, near Banff, Alta., (Sanson); Trans. Conn. Acad. Sci., Vol. 20, 153. Type locality with description, given in error as "Spray River, B.C."
59. *Pardosa grœnlandica* Thor. Banff, Alta., June 25, 1912; Sept. 7, 1913, (Sanson); Old Romain and Natashkwan River, South Labrador, (C. W. Townsend).
59. *Pardosa glacialis* Thor. Blanc Sablon, South Labrador, July; Natashkwan River, South Labrador, July, (C. W. Townsend).
60. *Pardosa luteola* Em. Banff, Alta., Aug. 8, 1914, (Sanson); Old Romaine, South Labrador, July, (C. W. Townsend).
60. *Pardosa tachypoda* Thor. Banff, Alta., July 4, 1914, (Sanson).

Attidæ.

66. *Dendryphantes flavipedes* Peck. Banff, Alta., (Sanson).
* *Pellenes sansoni* Em. Spray River, near Banff, Alta., (Sanson); Trans. Conn. Acad. Sci., Vol. 20, p. 154.

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FIFTEENTH ANNUAL REPORT

OF

The Agricultural Societies
OF ONTARIO

AND OF THE CONVENTION OF THE

Ontario Association of Fairs and Exhibitions

FOR THE YEAR

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1915

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Corner Queen and John Streets
Toronto

To His Honour SIR JOHN STRATHEARN HENDRIE, K.C.M.G., C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for consideration of your Honour the Report of the Agricultural Societies for the year 1915.

Respectfully yours,

JAS. S. DUFF,

Minister of Agriculture.

TORONTO, 1915.

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Annual Report

OF THE

Agricultural Societies of Ontario

1915

To the Honourable Jas. S. Duff,

Minister of Agriculture.

Sir,—I have the honour to present herewith the Fifteenth Annual Report of the Agricultural Societies of Ontario and of the Convention of the Ontario Association of Fairs and Exhibitions held in Toronto, on February 2nd and 3rd, 1915. This was one of the largest and most enthusiastic conventions held by this Association, and delegates from every section of the Province were in attendance from Kenora in the west to Glengarry in the east, including a large delegation from Ontario's Northland.

Excellent weather conditions prevailed during the exhibition season; a marked improvement was noted in the educational features of all the fairs in the Province, and fakirs and gamblers were not in evidence.

The Financial Statements appended hereto include all the transactions of the societies during 1914.

All of which is respectfully submitted.

Faithfully yours,

J. Lockie Wilson, *Superintendent.*

OFFICERS FOR 1915

President	J. C. Stuart, Osgoode Station.
First Vice-President	Wm. Scarf, Durham.
Second Vice-President	L. C. J. Bull, Brampton.
Secretary and Editor	J. Lockie Wilson, Toronto.
Treasurer	Alex. McFarlane, Otterville.

Directors.

District No. 1	J. E. Montgomery, Mountain Station.
District No. 2	W. J. Connolly, Cobden.
District No. 3	T. H. Thompson, Madoc.
District No. 4	Norman McGill, Millbrook.
District No. 5	Geo. Downey, Bolton.
District No. 6	Levi Moyer, Beamsville.
District No. 7	Dr. H. B. Atkinson, Embro.
District No. 8	T. W. Morrison, Mossley.
District No. 9	Jno Farrell, Forest.
District No. 10	Arch. Crow, Tara.
District No. 11	W. J. Hamilton, Raymond.
District No. 12	G. H. Farmer, Steelton, and E. F. Stephenson, New Liskeard.

Auditors—Dr. H. B. Atkinson, Embro; R. A. Agnew, Meaford.

TREASURER'S REPORT FOR 1914.

Receipts.

1914, Jan. 1st, To balance on hand in bank	$240 95
Memberships for year	240 00
Bank interest	6 98
	$487 93

Expenditure.

Members' receipt books	$1 50
Moore Print Shop, printing	24 23
Directors' expenses at meetings	71 50
Directors attending Fair in District	99 76
Honorariums to Officers	100 00
Auditors	10 00
A. Kent & Sons, badges	1 85
Assistants at annual meeting	12 00
Caretaker of Hall	2 00
Discounts on cheques for membership fees	0 55
Postage for year	2 54
Balance on hand in bank, December 31st, 1914	162 00
	$487 93

Audited and found correct.

(Signed) R. Agnew, W. Collins. } *Auditors.*

Alex. McFarlane,
Treasurer.

ONTARIO ASSOCIATION OF FAIRS AND EXHIBITIONS

FIFTEENTH ANNUAL CONVENTION

The Ontario Association of Fairs and Exhibitions held its Annual Convention in the Canadian Foresters' Hall, Toronto, on February 2nd and 3rd, 1915. All sections of the Province were represented and nearly five hundred delegates were in attendance.

PRESIDENT'S ADDRESS.

W. A. Crow, Chesley.

Each succeeding year the interest and enthusiasm of the delegates to this Convention continue to increase, and your presence here to-day in such large numbers representing all parts of this great Province, shows that this meeting will surpass any of the previous ones.

The year just closed has been a very successful one and the fairs in the Province were larger and better than ever, and, on the whole, weather conditions were exceedingly good, only about $2,800.00 of the $10,000.00 set aside for wet weather insurance being required.

Much dissappointment was expressed on every hand at the decision to cut of the several hundred departmental judges, whom it has been the custom for many years to supply to agricultural societies.

The arrangement, which has been in force for many years, was thoroughly understood by all concerned, and, practically, took the form of an agreement that Societies were to get judges applied for on condition that they paid the Department $6.00 per day for judges on circuit and $8.00 per day for special judges.

We were informed by the Superintendent last year, that he had a special arrangement with all the railway companies to carry judges at single fare rates.

When the judges were cancelled, which was done after all the meetings of directors had been held and final arrangements for exhibitions made, and in some instances, the notices were only received the day before the exhibition was held, great inconvenience was occasioned, and many of the Societies were heavily handicapped, and many directors' meetings were called with the view to cancelling exhibitions entirely, which was actually done in some cases.

Societies had got out of the way of employing local judges, and did not know where to get suitable ones at such short notice. Then, instead of single fare rates that the railways would have charged the Government, our Boards of Directors were obliged to pay full railway fares on the tickets of the judges secured in the place of those usually supplied by the Department.

The additional cost in this regard amounted to thousands of dollars when distributed over the different fairs, thus taking large sums of money out of the pockets of the farmers and putting it into the coffers of the railways, and, after all, governments are trustees handling the people's money, which should be utilized in the interests of economy.

Following this up, a letter was sent out by order of the Minister of Agriculture intimating that the grants to Agricultural Societies for 1915 would be reduced by fifty per cent. Here, again, I take it, is a master stroke of false economy.

I cannot close without referring to the irreparable loss sustained, not by Ontario only, but by the Empire, in the passing of our late beloved Premier, Sir James Whitney. True-hearted, honest and fair in all his dealings, he drew around him both Liberals and Conservatives, who learned as the years went by, to honour and respect him as a loyal subject of the King and Empire and a true friend of Ontario.

In conclusion, I have thoroughly enjoyed my relations with our esteemed Secretary, Mr. J. Lockie Wilson, who is always courteous, and through him our thanks are due the Government for the splendid reports of Agricultural Societies sent out to officers and members, which are from year to year more appreciated.

I have to thank you for the honour which you two years ago conferred upon me. I have endeavoured to prove myself worthy of confidence and give you faithful service.

I trust our Convention will be a successful one and I know my duties as your presiding officer will be light.

G. C. McClean: I consider this Convention to be one of the most important gathering of men that can be brought together in Canada, because it represents here the highest ideals of the agriculture of our country. We are gathered here to discuss methods and means by which the different phases of production can be brought to their highest development. We in Canada are facing conditions that are unprecedented in the history of the world. Three-quarters of the globe are to-day in state of war. The continent of Europe shakes to the tread of armed men. The call has gone forth and from every part of the wide world the sons of our Empire are hurrying to take their part in the battle line, content to die that men may have the privilege of living. We cannot all shoulder the gun and go and take the position that many of our boys are doing. We have to stay here, but there is a call that is just as important as that of shouldering a gun and perhaps in our case more so. Within the last two days all of you, I dare say, have seen in the daily press the call of Empire: "Feed us or we starve." And Canada is called upon to grow more grain, to raise more stock, to develop to the very highest extent her natural resources in order that the Empire may live. We have a task that is just as important as the carrying of arms, and, while we as a country are pledged to the last man and the last dollar and the last acre of our broad lands to support the Empire of which we are so proud to form a part, you who are here must develop to the very highest point and to the greatest extent the resources of our country. Co-operation is the keynote of the whole situation. By co-operation Great Britain has obtained her great strength and has drawn to her her sons from all parts of the world. By co-operation Canada has arrived at the present status of her greatness and is growing day by day greater and bigger. By co-operation we develop all that is highest in humanity and in our country and it is that spirit that brings you here so that, not as individuals but as a united body, you may accomplish the greatest good for what is the backbone of our whole country, the productivity of the land.

The proposed cutting off of part of our grant is a very serious matter. To-day in the country among the farmers Canada never enjoyed greater prosperity. There are spots here and there, I admit, in our wide country, speaking of the country as

End View of Field Crop Exhibit, showing some of the Ontario prize winning grain and **sheaves in the World's Competition.**

a whole, where drouth has militated very seriously against crops. In Ontario we have enjoyed a very large measure of prosperity and to-day, as you know, the farmers are more prosperous than they have ever been in the history of our land. There is no room in this country for pessimists. What we want is men of backbone, men who will say to us "Business as usual." All among farmers the slogan should be, "Greater Production." You are the backbone of the country, and when you are getting better prices there is no reason why there should not be an era, in spite of this war, of the greatest prosperity we have ever seen. And you are the ones who will make it.

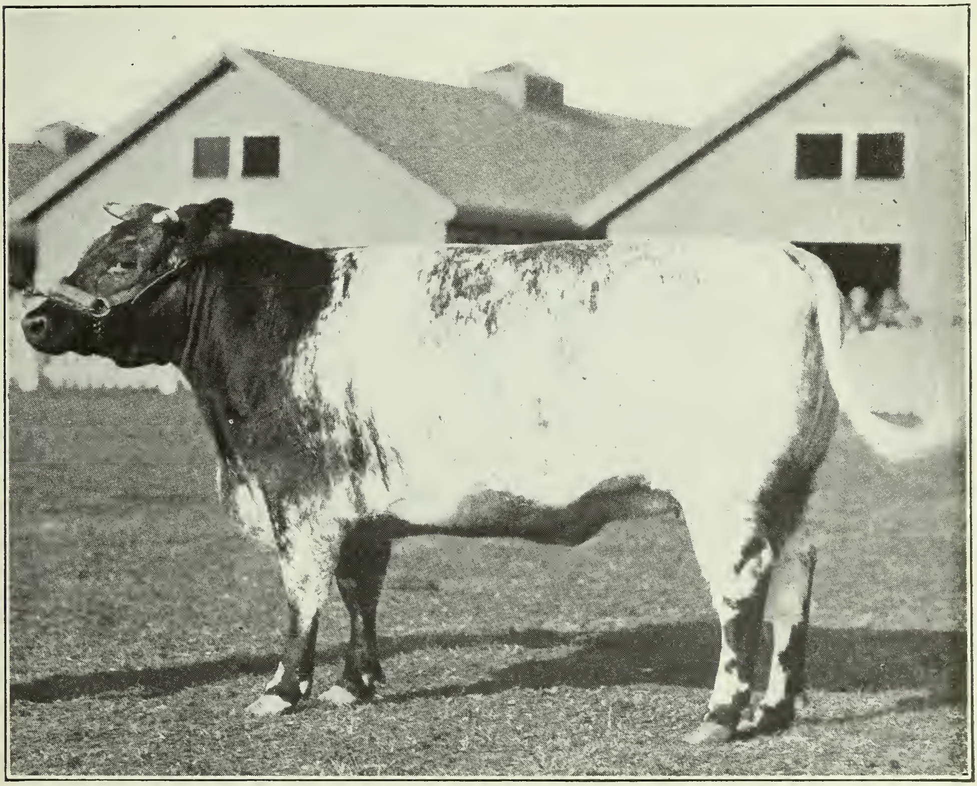
There is one point of minor interest as compared with these other matters that has not been touched on. I have received a notice that the railways intend to cut off return privileges of those sending exhibits to the different fairs. The small fairs are the feeders of the county fairs and the county fairs are the feeders of the big exhibitions at Toronto, Ottawa and London. And we want the best exhibits and best productions of this country shown in the very widest possible manner to the people of this country, and we want every facility given to these exhibitors from all over Ontario to show stock and their products and have every facility given to have these products returned. I ask this meeting under the direction of your able President and Secretary to take action in that matter and see if it cannot be carried to the Railway Commission so that pressure may be brought to bear on the railways.

WM. SCARF: When your Executive met last September there was no one more surprised than we were when we found that the Government had cancelled the Departmental Judges, but the time was then getting too late for us to make any move, so we appointed a small committee to look into the matter and see what could be done.

I am going to read to you the resolution that was moved by myself and seconded by Mr. McClean.

Moved by W. SCARF, and seconded by G. C. MCCLEAN, "That this Convention of delegates representing the Agricultural Societies from all parts of Ontario desire to express our disapproval of the proposed cutting off of our Departmental Judges and the reduction of the regular grant given to Agricultural Societies for over a quarter of a century of $75,000. Our Societies are doing splendid educational work and assisting materially to increase the live stock and field crops of Ontario, and we are of opinion that our Societies would be seriously crippled if the grant is reduced as proposed. We are just beginning to appreciate the value of the standing field crop competitions, and under the rules and regulations each Society for the three crops that they are allowed to compete in is obliged to contribute to the extent of $75. The number of Societies in the Province is increasing as the years go by and each additional Society organized receives a maximum grant of $300 for the first three years. In Northern Ontario alone nearly fifty new Societies have been organized, and their grant is based on their expenditure for agricultural purposes as in old Ontario, with the addition that they receive $2 for every $1 that Societies in the older sections receive. Under all these circumstances we are of opinion that it woud be a vital mistake to make any change so as to injure the financial standing of the Societies. We would further move that a committee be named by the President to wait upon the Premier and the members of his Government, and arrange to meet them to-morrow afternoon at a time to be fixed by them." The following were appointed as the committee: Messrs. Crow, Scarf, McClean and Stuart.

As Chairman of that Committee I tried to get such data as I could from other Provinces of this Dominion. I have letters from the Prime Minister of every Province outside of Ontario and the following are the results of my investigation: Last year there were 65 Societies in British Columbia which received a grant of $85,000. And not only in this way has that Province helped the Societies. During the last five years it has contributed $130,000 to help them in erecting buildings on their exhibition grounds. If you divide the 65 Societies into the $85,000 you will find they gave to each Society $1,308. If we with our 380 Societies, got the same proportion as they did, we would be getting no less than $497,000.



Shorthorn.

From Alberta we could not get the figures as accurately as from the other Provinces, but we found there that for every one who becomes a member of a Society the Government contributes one dollar and also for every dollar expended in prize money the Government pays two thirds of it. In Ontario the Society expends two-thirds and the Government one-third. The grants to the Alberta Societies during the past year was $100,000.

Saskatchewan has 110 Societies. They gave $60,000 of a grant, and the average to each Society was $545. Now, suppose we in the Province of Ontario had received the same amount as they did our grant would be 207,000. In Prince Edward Island they give to each Society $1,308, which, in the same proportion for Ontario would amount to $497,000. In Quebec they have 86 Societies and the grant was $130,000. The average for each Society was $1,512. If we had got the same proportion as they we would receive $574,000.

In our Province, as you are well aware, there are 380 Societies and we only get $75,000. The field crops of the Province of Ontario in the year 1912 amounted to $88,000,000, nearly $11,000,000 more than the year before. We grow as much as the next best two provinces in the Dominion. In the Province of Ontario our dairy products lead the Dominion. We do the same in our fruit and stock. I think any reasonable Government could see that we want more encouragement in Ontario than they do in any other province.

THE PRESIDENT:—The object of appointing a committee, as I understand it, was to wait on the Government and arrange for a time when you could meet them. If you pass Mr. Scarf's motion I will appoint this Committee. The motion was carried.

I appoint Messrs. Scarf, McClean, Sheppard and Stuart to interview the Government and find out what would be the most convenient time to receive their application.

J. W. SHEPPARD: I move that we as a body meet the members of the Cabinet and lay the case before them. The motion was seconded and carried.

JOHN FARRELL, Forest: I am delighted after an absence of two years to have again the privilege of meeting you all. While employed on immigration work in Great Britain during the past two years I travelled through every county, and was able to offer intending immigrants advantages and possibilities far ahead of those offered by other parts of the Empire and by the Argentine Republic. I did not come here to talk immigration, but I thought it might interest you to know that Ontario to-day with all its industries, agricultural and otherwise, is thoroughly known in the Mother County. And if it were not for the unfortunate circumstances that confront us as an Empire to-day, there would have been not only an immigration of the very best stock of the British Isles, but a great deal of additional wealth would have been invested in the Province of Ontario.

One particular thing which has advertised us in the lands beyond the sea is the splendid agricultural exhibits of the Government, who have their buildings on the Strand in the very centre of London. In the plate glass windows are the products of the soil which are changed every day.

REPORT OF SUPERINTENDENT.

J. LOCKIE WILSON, TORONTO.

Notwithstanding the financial stringency, and the war in Europe, the Fairs and Exhibitions held in Ontario in 1914 under the auspices of our Agricultural Societies were a success both in attendance and exhibits, and officers and directors are to be congratulated on the splendid work they have done in 1914.

The gate receipts at some of the larger exhibitions in the Province were somewhat lessened on account of the directors not having been able to make as satisfactory arrangements with the railways for reduced rates as in previous years, but, as stated above, taking the fairs all over Ontario, this was one of our most successful years.

The weather during the greater part of last fall was ideal for the holding of exhibitions, and only twenty-four Societies suffered loss in gate receipts owing to wet weather, the total grant apportioned being $2,885.00, out of the vote of $10,000. Brockville was the only one to obtain the maximum grant of $300, and with four other exceptions, all the other grants were for amounts under $200.00, ten being under $100. A change was made in the Act at the last session of the Legislature, basing the grant on 60 per cent. of loss instead of 50 per cent. as formerly. This partly carried into effect a recommendation passed at your last convention that the grant be based on 75 per cent. of loss. Your request that instead of the average of three previous years the average of three previous normal years be taken was not adopted by the Government, but the Act was changed to enable Societies which had been organized for only one or two years to participate in the wet weather grant, the amendment being as follows:—"In the event of a Society which has been organized for only two years suffering loss in gate receipts owing to wet weather, it shall be entitled to receive a grant equal to 60 per cent. of the difference between the gate receipts of the current year and those of the previous year. In case of loss of gate receipts from the above cause during the third year of a Society's existence, the grant shall be 60 per cent. of the difference between the gate receipts of that year and those of the average of the two previous years, but the amount to be paid shall not exceed $300."

Acting on the instructions of the Minister of Agriculture on August 29th, I sent out to all the Societies of this Province a letter informing them that no Departmental Judges would be furnished to Fairs and Exhibitions, and that the grant for 1915 might be reduced by 50 per cent. I have had no instructions so far as to what will be done this year.

We held our usual Short Courses for Judges at Guelph and Ottawa, and of 600 judges nearly 300 attended at Guelph and about the same number at Ottawa.

The following three new Societies were organized during 1914:—Acton, Cochrane, Martland and Cosby.

FIELD CROP COMPETITIONS.

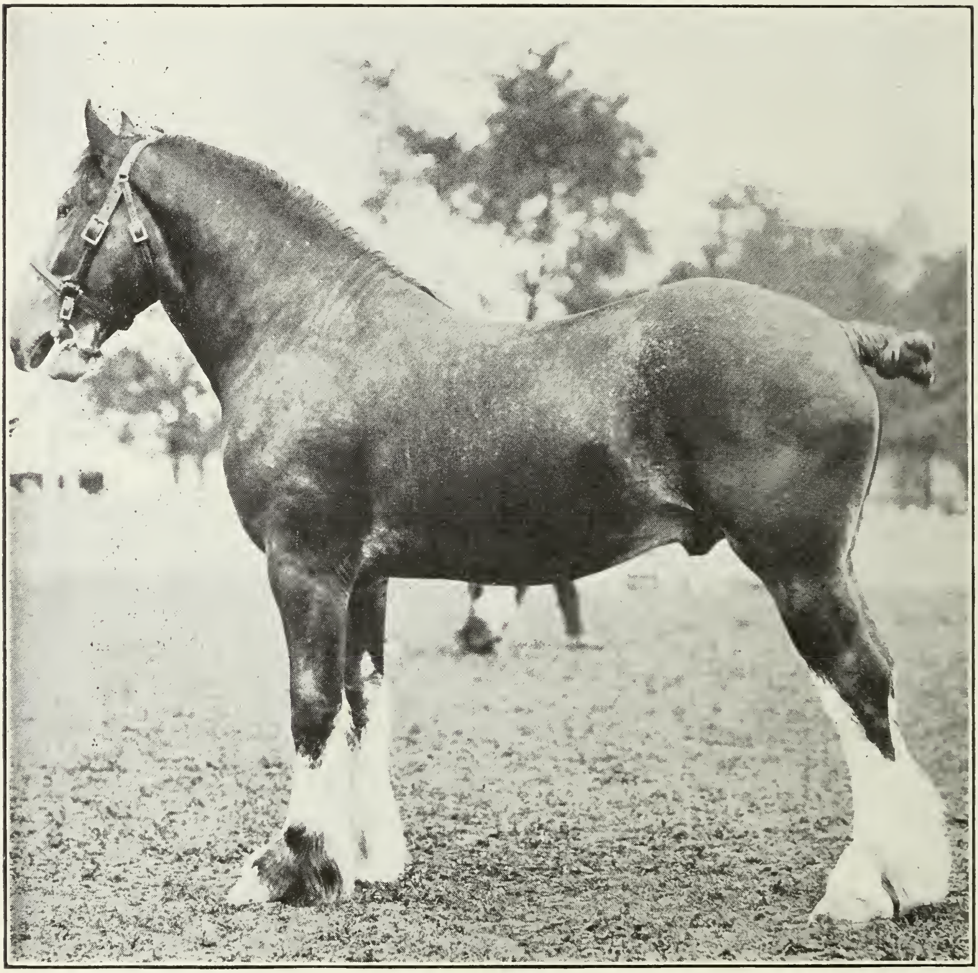
Field Crop Competitions continue to meet with the approval and active co-operation of the Societies in the Province which have up-to-date and enthusiastic officials. The lines of work in these competitions have been largely broadened and a Society can now enter in three crops instead of one as heretofore, and instead of a Legislative grant of $50 to a Society, it is now entitled to $150, if entry is made in three crops. Quite a number of Societies took advantage of the opportunity in this regard, 110 entering in one, 38 in two, and 24 in three crops, a total of 258 competitions, as against 159 in 1913. Oats were, as usual, the choice of the majority, 143 Societies selecting this crop, 35 corn, 35 potatoes 18 barley, 6 fall and 6 spring wheat, 5 peas, 4 mangels 3 turnips, 1 alsike clover, 1 red clover and 1 sugar beets. As compared with 1913 the entries for 1914 are as follows:—Oats show an increase of 30 per cent., corn, increase 75 per cent.; potatoes, 191 per cent.; barley, 125 per cent.; fall and spring wheat each 100 per cent.; peas, 400 per cent. Red clover entries show no increase, while alsike, mangels, turnips and sugar beets appear in the list for the first time in 1914.

To give you some idea of the way these Field Crop Competitions have expanded, a comparison between 1913 and 1914 will be interesting.

	1913.	1914.
Acreage	35,000	60,000
Competitors	3,500	6,400

It required the services of 110 men to judge the fields as the crops ripened.

The improvement manifested, not only in the Standing Crops in the fields, but in the preparation of grain and sheaves for exhibition and of grain for seed by members of Agricultural Societies, who have participated in these competitions for a number of years, is very evident, and those who exhibit for the first time get much needed education in the selection of grain by comparing their own products with those of others who have had greater experience in this line of work. This is especially noticeable at the Guelph and Eastern Ontario Winter Fairs, where most of the grain sold is purchased by farmers, who pay good prices for such as is clean and of good quality.



Clydesdale.

Some of the Societies did not live up to the Rules regarding these Field Crop Competitions in 1914. The agreement is that the number of entries must not be less than 10. Some of them made the minimum number of entries, but the Secretaries failed to notify me later on that some of the competitors had withdrawn, and the first intimation I received was from the Judge, who found that only six or seven had remained in the Competition. As $75 are offered in prizes in each crop competition, unless there is a reasonably large number of entries, the work fails to be of the educational value it otherwise would be. In future, I would suggest that more care be taken in this regard and the regulations be followed closely.

Marked improvement is noted in the evenness of the ripening of the crops this year, on account of the competitors having all sown about the same time. I would urge you to continue this plan, as it gives the Judge a better chance of doing his work satisfactorily when the different fields are at about the same stage of ripeness.

PURCHASE OF GROUNDS.

Quite a number of Societies are contemplating the purchase of new grounds or increasing the area they already have, and from the number of letters received by me from different Societies, it is evident that they are not acquainted with the method of procedure in such cases. The sections of the Act dealing with this are as follows:—

(1) "Every Society shall be a body corporate, with power to acquire and hold land as a site for fairs and exhibitions and, subject to the approval of a meeting of the Society called for the purpose, to sell, mortgage, lease, or otherwise dispose of the same, or any other property held by such Society.

(2) "At least two weeks' previous notice of such meeting shall be given by advertisement in one or more newspapers published in the county or district and by printed placard; and at such meeting only those persons shall be entitled to vote who are members for the current year and who were members for the two previous years.

(3) (*a*) "If the owner of the land selected as a site for fairs and exhibitions approved of at a meeting of the society called for that purpose, refuses to sell the same or demands therefor a price deemed unreasonable by the Board of Directors, then such owner and such Board of Directors shall each forwith appoint an arbitrator, and the arbitrators so chosen shall appoint a third, and such arbitrators or a majority of them shall determine the value of such land;

(*b*) "If the directors or the owner of such land neglect or refuse to appoint an arbitrator, the Senior Judge of the County or District Court of the county or district in which the land lies may, on the application of the party who has so appointed an arbitrator, and on notice to the opposite party, appoint another on behalf of the party so neglecting or refusing to appoint one:

(*c*) "If the arbitrators appointed as aforesaid fail to agree on, or either of them refuse to appoint a third one, the senior judge of the county or district court of the county or district in which the land lies may, on the application of one or other of the said arbitrators and on notice to the other, appoint a third arbitrator;

(*d*) "The arbitrators so chosen shall have the power to hear and determine all claims or rights of encumbrances, lessees, tenants, or other persons as well as those of the owner of the land required for the purpose of such site upon notice in writing to every such claimant or person;

(*e*) "Upon payment by the directors of the amount determined by a majority of the arbitrators appointed as aforesaid, to the owner or other person entitled thereto, the land may be taken and used for the purpose aforesaid:

(*f*) "Any award for a site for fairs and exhibitions made and published under the Act, if there be no conveyance, shall be deemed thereafter to be the title of the society to the land mentioned in it, and shall be a good title thereto against all persons interested in the land in any manner whatever, and shall be registered in the proper registry office, on the affidavit of the secretary and treasurer or secretary-treasurer of the directors verifying the same;

(*g*) "The parties concerned in all such disputes shall pay all the expenses incurred in regard to them, according to the award or decision of the arbitrators or a majority of them.

(4) "The provisions of Subsection 3 shall be exercised only by consent of the Lieutenant-Governor in Council."

We are living in strenuous times, and it is the duty of every stockman and farmer to do their part in preparing for the time when the battle flags of the nations will be furled and the starving millions of the shot-shattered countries of Europe will require your products to feed what is left of them.

The Motherland is looking to the farmers of Canada to sustain her armies that are fighting for a world's freedom. Patriots have left our shores and are now on the battle line, and the patriots who remain at home have as great a work to do on farm and in field and factory, for our Empire and our allies.

I thank you from the bottom of my heart for the kindness and courtesy you have always extended to me for my nine years service in the Department of Agriculture. I appreciate it very much; you have stood by me in all of my efforts and they would have been of little value if you had not been at my back.

DAVID EVANS: The Strathroy Society made entry in two crops in the Stand-the Field Crop Competitions last year. While I express my gratification at the splendid results obtained, yet the judge's decisions were not satisfactory to every one of the competitors. I do not suppose that any system can be adopted that would give universal satisfaction, yet I believe in this case that there are good grounds for some dissatisfaction. It is stated that on the score card nothing is allowed for abundance of crop.

J. LOCKIE WILSON: You are misinformed. Points are given for that.

DAVID EVANS: I am told that probably in the competition there might be in one instance a field that would be producing from 55 to 70 bushels per acre that may receive first prize, while another that would be producing 80 would not get it, and yet have just as good a sample of grain, although the field might contain a few weeds and an odd head of other varieties of grain.

In connection with the potato competition the same thing resulted. I am told that the plot that was awarded first, yielded about 300 bushels per acre, while from some of the others that were placed lower over 400 bushels were dug. If you take an acre of potatoes and dig so many feet in one row you cannot always judge what is going to be produced by the whole plot, though you may think you are selecting some of the best. Several places in the field should be taken in order to arrive at what would probably be the product of the whole field. There should be some system devised because the way the plots were judged in our competition has caused some dissatisfaction.

J. LOCKIE WILSON: Criticism of this kind is the only way that we can arrive at or as near perfection as possible, and I am glad Mr. Evans has brought this matter up. In the score card for grain used by judges twenty-five points are allowed for yield and quality of crop.

Parade of cattle at the C. N. E.

As regards potatoes, a judge going into a field may take the poorest part of it. It may be wrong, but that may be his policy. Mr. Evans' suggestion is a good one and I will recommend to the judges that, if their plan is to select the poorest part in each man's field, they had better select two spots, the weakest and the strongest. The following is the scale supplied to judges of potatoes at the present time in order to get the product of one square yard. Where rows are 24 inches apart, dig up 18 feet of a row; where they are wider, dig shorter lengths:

SCALE FOR JUDGING POTATOES IN THE STANDING FIELD CROP COMPETITIONS.

Width between rows in inches.	Length of row in feet to be dug.
24	18
27	16½
30	15
33	13½
36	12
39	11¼
42	10½
45	9¾
48	9

This will give 4 square yards, and this divided by 4 will give a good average for one square yard,

W. J. CONNELLY: Last year the Cobden Society took up Field Crop Competitions in wheat, peas and oats and we charged a fee of 50 cents. In the three competitions sixty-five entered, and we secured members for our society that we would not have obtained in any other way.

So far as the judges are concerned, we did not hear one single complaint about the decisions in our competitions. The results of this work have proved of the greatest value to our members, and we consider this the best line our society has ever taken up.

JOHN BRODIE: I endorse what the previous speaker has said. As regards our society in the Field Crop Competition, we have had the best of satisfaction. We entered in potatoes and oats. Some of the competitors in potatoes had 500 bushels and over to the acre. We found the judges very satisfactory in the two years in which we held these competitions.

G. J. MELDRUM: Our Puslinch Society was one of the first ten which entered the Standing Field Crop Competitions. In 1907 we entered in barley and the next year in oats, and since then we have taken oats steadily all through and have charged 50 cents entry fee. Our first prize winner this year, John A. Cockburn, took third at the Toronto Exhibition, and first at the Winter Fair at Guelph. There is one drawback and that is that we have eight or ten members who enter every year, and we cannot induce any more to enter, as they say it is no use because these eight or ten men prepare their ground so carefully each year, and it is only throwing away 50 cents if others enter. This year at the annual meeting it was arranged to give those who have not entered before a chance to do so, as we are going to enter in wheat and potatoes in addition to oats.

C. HOLLIDAY: I wish to ask Mr. Wilson if the directors of a society can decide as to what particular kind of oats, wheat or other grain for the Field Crop Competition must be grown?

J. Lockie Wilson: The directors are in charge and they can select any variety of crop they like, but, of course, if the crop selected was not satisfactory to the majority of the members, the directors could be brought to task for it.

Fred. Wickham: The judge in our wheat competition did not give out the scores of the winner for some days after. Should not these be announced at once?

J. Lockie Wilson: The judges have instructions to leave the names of the prize winners with the secretary and forward his score cards to my department. The reason is, a judge may have twenty or thirty fields to go over, and it takes him a little time to total the scores, and this requires to be carefully done after his work is completed. The most important ones are the five highest scores, as the grain from these has to be prepared for exhibition at the Canadian National, and Central Canada Exhibitions.

A Delegate: I wish to ask the Superintendent if it would be proper for a Board of Directors, when entry is made for corn in the Field Crop Competitions to determine whether it be yellow dent or any other type of corn.

J. Lockie Wilson: It has been decided to permit societies who have competitors in flint and dent corn to divide the grant and give half to flint corn competitors, if sufficient in number, and the other half to those entering dent corn. There must be, however, not less than ten competitors in each variety you go into.

A. E. Annis: In connection with the grant which the Government has given due notice to the societies that they intend to cut in two, the Department, in my opinion, has dealt fairly with the association. In this strenuous time when it becomes every patriotic man to cut down his expense in such a way as to economize, they have done right. I do not think it behooves the leading farmers of this Province to go to the Government, hat in hand, and ask them to dole out a few dollars. I protest against going to the Government about this grant.

W. L. Patterson: In regard to the Field Crop Competitions, in our society we find some difficulty in getting enough men to compete to make the required number, one of the great objections urged, especially by new men whom we are trying to interest, being that there is no use in their entering because those who have entered in previous years are sure to win the prizes. I would ask the Superintendent if a society can legally pass rules that after a man takes first prize for one or two years, he can be refused the privilege of entering, in order to give new men a chance to win.

J. Lockie Wilson: Do you think it would be good policy to penalize a man because he has taken the pains to eradicate weeds out of his field and sow good, clean grain? It is not customary for Agricultural Societies to bar a man from exhibition because he was fortunate enough to win two or three prizes in previous years. If they were barred, I fear that the exhibits at our fairs would not be as creditable as they are. I would advise those who complain to brace up and secure some prize winning grain, see to it that no noxious weeds spring up in the fields you enter and they will be winners in time.

The report was adopted.

REPORTS OF DISTRICT DIRECTORS.

District No. 1.

James A. Fraser, Director: District No. 1, in the eastern part of this Province, has twenty-six Fall Fairs. I visited as many as circumstances permitted and was welcomed by the Officers.

At all the small fairs when the weather was fine the attendance was good. The war cry did not seem to have any effect on those fairs.

At some of these fairs horses and cattle were the leading features, while at others roots and vegetables predominated. At one place where I was judge of fruit and flowers and other exhibits, there were some of the best and largest roots I saw at any fair last fall.

A few years ago I was not in favor of those small fairs, now I have changed my mind. They pay more actual prize money in proportion to the amount they handle than the larger fairs, which pay more for sports and other amusements. One fair paid in prize money $638.75; horse races, $650: amusements, $885. This fair handled over $3,000 and has no balance. The judging was all good and I heard no complaints. There is a need for some publishing company to print blank books suitable for fair purposes. I saw several secretaries who were making their own entry and score books from blank paper.

District No. 2.

G. C. McClean, Director: I am pleased to report that, with a couple of exceptions the fall fairs of No. 2 District were very successful, notwithstanding the feeling of unrest engendered by the depression of business and on account *of Canada* being involved in the present great world-wide war.

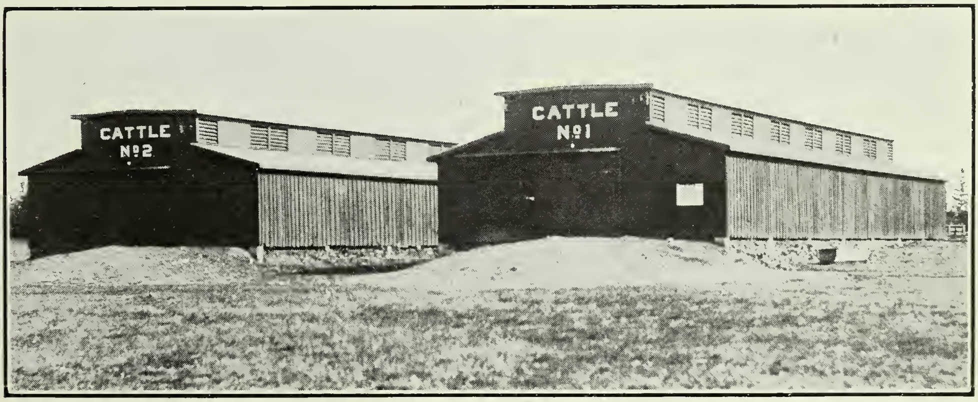
The agricultural districts were never in better shape. Prices have been good, and crops above the average, and in consequence the attendance and exhibits were in many cases larger than ever before.

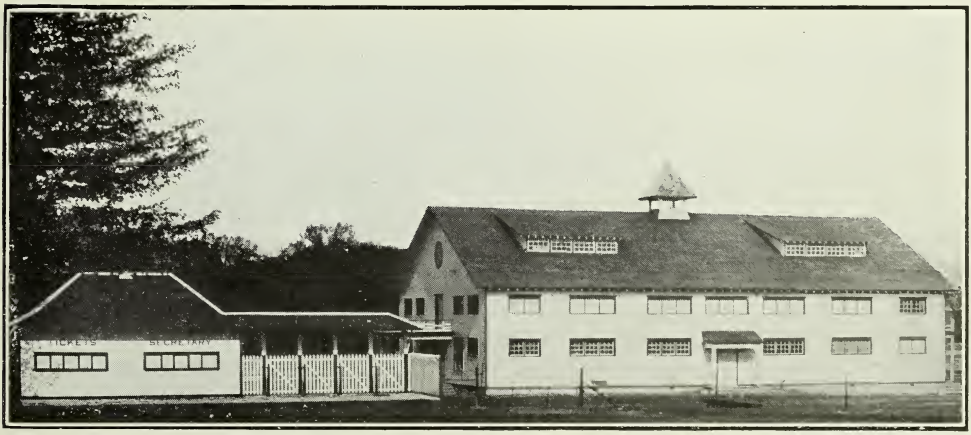
The confliction of dates in my district has again caused considerable trouble, and I do not see how there can be a change for the better, until the Department of Agriculture insists that the dates of each fair be registered, and no change made without authority.

There is a lack of uniformity in the handling of books, prize lists and exhibits at the different fairs, and while the requirements of each district is to be considered, a great improvement could be effected if the Department would establish a standard and publish a handbook of directions for the guidance of officers and directors.

The action of the Department of Agriculture in cutting off the services of the departmental judges on such short notice, was a severe blow to the different associations. In many cases unqualified men had to be appointed as substitutes, and in nearly all cases the change was a source of dissatisfaction.

The action of the Government in reducing the annual grant by fifty per cent. is condemned in the strongest terms, and if carried out as advised, will seriously decrease the efficiency of the different organizations for the coming year: the injury being caused as much by the moral effect, as by the actual reduction of the grants.





Fair Buildings of the Woodstock Agricultural Society.

The fall fairs of No. 2 district have reached a very high point, and a move backwards on the part of the Government will have a corresponding effect on the directorate of the individual associations, which all interested in the progress of agriculture sincerely hope will not be carried out.

District No. 3.

Geo. A. Hay, Director: As director for this district, I visited in all ten fairs, and in every case found the attendance good. The earlier fairs suffered to some extent through the effects of the long continued dry weather.

The root and vegetable exhibits were below the average, but the later fairs made up in quantity as well as quality, some of these having exhibits above the average.

Stock exhibits showed a marked increase in numbers, but the condition of some was not quite up to the average.

The attendance at all was good, and in nearly every case gate receipts showed an increase, and the interest was very keen. The race horse still holds a prominent place at the local fair. One fair visited had no races and suffered through want of interest of the spectators. The directors of this fair will have to use a lot of energy to get attendance next year. This is the only one visited that did not adhere to the slogan "Business as Usual," and the only one where there was not a protest against the Government cutting the grants fifty per cent.

Many of the fairs are encouraging competition in the schools, owing no doubt to the fact that agriculture is taken up in the schools more than ever before.

This is, I believe, one of the subjects that should be debated at this convention as to the best means and the best subjects to be taken up for school competitions.

The directors of most of the fairs visited seem to be of the opinion that local fairs need more special attractions, especially in the rural township fair. This, I think, is largely accounted for by more of the rural population visiting the Toronto Industrial and other larger fairs.

The exhibits of ladies' work and fine arts are largely on the increase, the reason for this being that the professional exhibitor is being curtailed more and more by the local fair. Such lines as dressing and preparing fowl, etc., are also making rapid progress, as is also cooking and preparing fruit at home.

District No. 4.

John Carew, Director: In presenting my report for the past year, I may say that I attended a number of fairs in this district and found the majority of these enjoying success and blessed with very favourable weather conditions.

The peculiarity about a successful fall fair is that nothwithstanding how much time and money the directors and supporters spend in trying to bring about the highest attainable success, from a financial standpoint, unless good weather conditions prevail it cannot be a success, as the people will not attend.

Although the fairs in our district did not have the crowds they had in 1913, they were fairly well attended considering the depression that has prevailed all over the Dominion on account of the great European war which has been raging for the past six months.

As President of one of the best county shows in Canada, I would like to say a word about fall fairs. In my estimation they are one of the best institutions we have in our country to educate the general public, and especially the young farmer. They should get the best support from all classes of people. This institution should have at its head the most energetic and up-to-date men obtainable. Supporters should attend the annual meetings of the Board, and offer the directors any pointers to assist the fair in attaining the highest success. The board of directors is always glad to get their support and this is all required to bring the institution to the standard it should be.

I trust that by the time we have to report on the business of this year the awful war will be over and peace will prevail all over the globe.

District No. 5.

L. J. C. Bull, Director: Comprised in District No. 5 are the Counties of Simcoe, York, Peel, Halton and Dufferin, with thirty-two agricultural societies. During the year I visited eighteen fairs, some of the best in the Province, including the Canadian National Exhibition, and all who visited this in 1914 were delighted with the exhibit of grain and sheaves from the Standing Field Crop Competitions, and the very creditable display made by the Province of Ontario.

The Standing Field Crop Competitions in those counties are doing a good work in encouraging better farming and better selection of seed, also making it easier for all to secure good clean seed of the best varieties of grain grown in their localities at most reasonable prices. This year the competitions will be keener than ever before, as several who have never competed at a fall fair or entered a Field Crop Competition have decided to do so, and will use more care in the selection of seed, and their fields will be better cultivated. The results will be to render farm life a little more interesting and also better returns for the work done.

School fairs are flourishing and doing a good work and becoming more popular each year. The boy who feels that he owns some pure-bred fowl, a garden, or some live stock, and is encouraged to take an interest in such is pretty sure to make a contented successful farmer.

During the season of 1914 weather conditions generally were most favourable and the fall fairs well attended.

Reports from the secretaries show a substantial increase in the number of entries and the interest taken in the fairs.

I wish to thank the directors and officers of the different societies for their courtesy to me during the year which made my duties a pleasure. One feature of special interest at a number of our fairs is the judging competition open to farmers' sons under twenty-five years of age. Heavy or light horses, and beef or dairy cattle are usually judged. This brings the parents and friends to the fair and the ringside to watch the boys, and it is educational for all; but too much care cannot be exercised in the selection of judge for a class of this kind. A man who is not a real judge should never be put in charge of such a class. A committee to look after fakirs is almost a thing of the past, and our fairs are cleaner, better and more educational than ever.

District No. 6.

J. W. SHEPPARD, Director: District No. 6 comprises the Counties of Haldimand, Lincoln, Wentworth and Welland, known as the "Niagara District" or the "Garden of Canada," famous for its fruit production, progressive agriculture, and the loyalty and devotion of its people to the British flag; the brightest gem within the diadem of Britain's crown, whose chain of counties forms a chaplet which might well be the envy of any queen.

I visited a few fairs as the opportunity presented itself, and am pleased to report success and progress all along the line. Fine weather prevailed generally, and the various societies enjoyed a year of average prosperity.

I am of the opinion that the resolution passed by this association some two years ago limiting the Government grant to any one society in any year at $500, should be again pressed upon the attention of the Department and our representatives from the different counties in the Legislature firmly and resolutely.

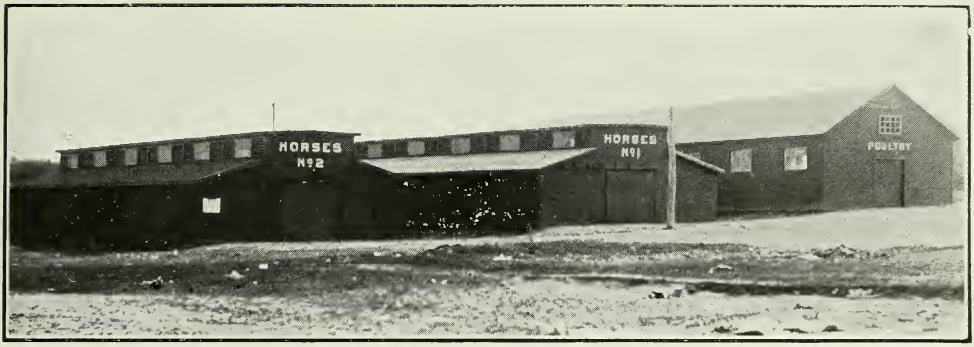
This limitation would give greater encouragement to the smaller fairs which are striving to the utmost of their endeavours to stimulate agricultural interests in their respective spheres of influence. Approximately some twenty societies received over $500 in 1913.

The other 340 societies receiving a grant of about an average of $150 to $200 are doing good substantial work to the limit of their financial ability, with average gate receipts each year, and in the majority of cases the Government grant remains stationary or decreases a little, owing to the great advantage of other societies situated at points ensuring large gate receipts, which enable them to pay out more money for agricultural purposes by giving a prize of $5 where a less favoured but just as active and progressive society can only give $2 or $3, thus securing to these fairs the lion's share of the Government grant. These so-called big fairs in the various counties of the Province are not in need of the extra financial assistance that the Government gives them to the limit of $800. A limit of $500 would be ample, and this would give the 340 other societies in the various counties of the Province, not blessed with such favourable geographical conditions and circumstances as the bigger fairs, great encouragement and chance of development. If the principle is right why limit the grant to $800. This limitation only proves the contention that it is only justice to meet the wishes of the large membership of some 340 fairs of the Province, and limit the grant to $500.

I visited one fair in my district at a point with no railway facilities which for 1913 had gate receipts of $55, membership, 62, and special attraction expense of $10. I was pleased to note in 1914 the enlargement of the grounds of this fair to double the size, great energy and enthusiasm on the part of the directors and exhibitors, and I felt that it was not right to discourage or penalize this expansion and extension of influence of this small society located in a purely agricultural township by allowing the big fairs the advantage they possess of continually creeping up to the $800 limit. This society only received in 1913 a Government grant of $48. I venture to say that the policy of this association and the Legislature should be to build up and encourage such small societies located in purely agricultural sections, encourage production generally, and not discourage agricultural enterprise in one section for the benefit of another.

Experience teaches us that men and women, boys and girls, will exhibit their products at their local fair within a few miles of their homes, but will not go to the trouble and expense of showing their excellent exhibits at the big fairs some distance away. If, therefore, we wish to encourage our producers in all lines of agricultural effort we must provide opportunities for them to study and emulate the exhibits of their neighbours at the fair most convenient to their farms.

For these reasons I hold to the opinion that a limit of $500 to any one fair of the Government grant in any year will give the smaller fairs more encouragement.



Horse Barns at Woodstock Exhibition.

District Meetings.—It appears to be the concensus of opinion that district meetings are popular and desirable among the directors of most fairs. These meetings are most interesting for the discussion of detail and uniformity in the management of fairs, in prize lists, rules and regulations, and the extension of influence of each society. I therefore recommend greater interest in and attention to district meetings. Probably the districts are too large for intensive work as at present constituted. The idea seems to prevail that the district meeting is largely for the purpose of arranging fair circuits. Most dates are fixed at the annual meeting of each society, and the best evidence I can give of the benefits of holding a district meeting is to give a report of our meeting.

New Sheep and Swine Shed at Woodstock.

In district No. 6 the district meeting was held at Caledonia as a most convenient and desirable point for the whole district on October 23rd. Some twenty-two delegates and our efficient superintendent, Mr. J. Lockie Wilson, were present. There are twenty-three fairs in this district and the attendance of delegates should have been forty-six. The Department allows the expenses of delegates to the district meeting to be included as expenditure for agricultural purposes in determining the Government grant, which should encourage attendance at district meetings.

Your director was in the Chair and Mr. W. A. Fry acted as secretary. A general discussion was held.

It was resolved on motion of Messrs. Gainer and Laur, that the delegates from the fairs included in Group 6 be asked to introduce and support strongly at the next meeting of the central body a resolution, urging the Government to reconsider its determination to cut the annual grants and, instead, increase them if possible.

It was resolved on motion of Messrs. Mehlenbacher and Hamilton, That whereas the Department cancelled the assignment of judges to the various fairs this year; Therefore be it resolved that this district meeting impress upon the Department the actual necessity and desirability of continuing the Departmental judge system, in the interest of competition at our fairs, and strongly recommend the continuance of the same on the same terms as fixed heretofore by the Department.

The necessity for more uniformity in the rules adopted by fairs in the district received attention.

Some fairs give one member's gate ticket, some two, some three. All fairs represented give free admission to vehicle with member.

It was finally suggested that the maximum number of gate tickets to be given with member's ticket be two. (In most cases the exhibitor gets good value for $1 without gate tickets).

The rule of retaining $1 for next year's membership from exhibitors winning $5 or more in premiums was discussed, and benefits derived from that rule explained.

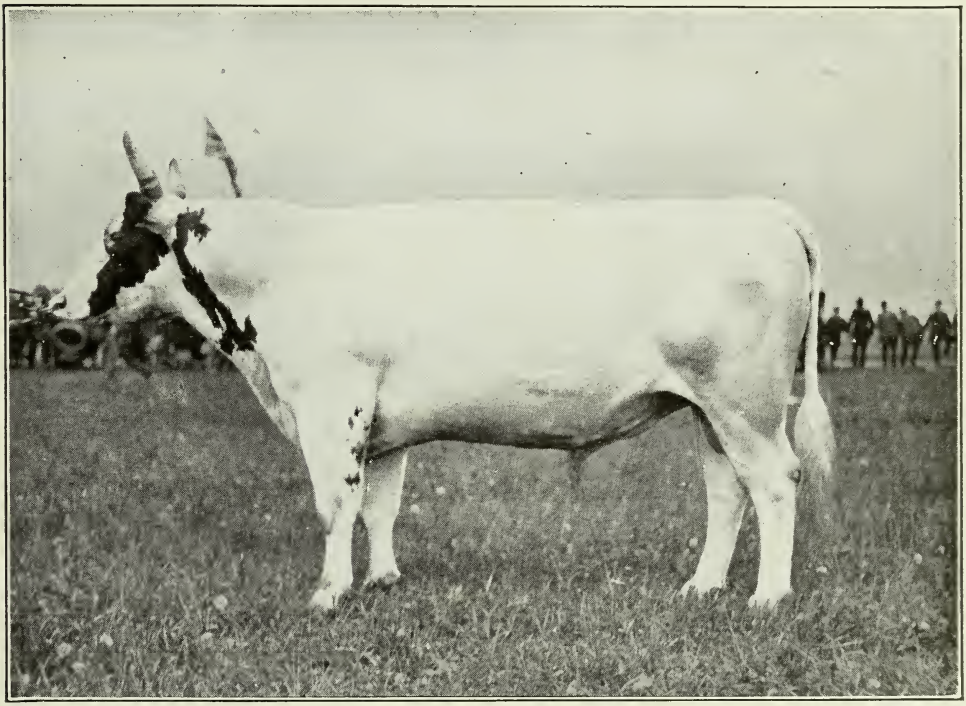
A great difficulty experienced in all country fairs is in getting entries in in good time.

It was moved by Messrs. Richardson and Laur, and carried unanimously that this meeting suggests that in all of the fairs in Group 6, entries close at least one day before the first day of the fair, parties becoming members after this time to pay $1.50 membership, and on the days of the fair 10 cents additional for each entry.

It was moved by Messrs. Laur and Douglas, and carried as follows: That public school children be admitted free to the fair on any day selected by the society, by ticket issued through the teachers. The plan of having the members' tickets printed and issued to the directors at the annual meeting was strongly approved. The Caledonia delegates recommended the general adoption of their plan of supplying the judges of ladies' work and fine arts with a red ticket to attach to articles shown year after year.

Mr. J. Lockie Wilson then delivered a very comprehensive address upon the work of agricultural societies, enlarging upon the foregoing programme and discussion, which was very much appreciated containing as it did much information and inspiration.

The delegates then through the kindness of the officers of the society visited the fair grounds of the Caledonia Agricultural Society, inspected the buildings and grounds of this fair, and the many features provided for the accommodation of exhibitors and the public. The delegates also expressed their appreciation of the hospitality of the Caledonia Fair Board, and the town for the use of the Town Hall for the meeting, and to Mr. J. Lockie Wilson for his attendance. Outside of those districts that meet in the spring to arrange fair dates, etc., the fall of the year when the fairs are over and needed improvements are fresh in the minds of fair officials, appears to be the ideal time for holding district meetings. Getting together in a spirit of goodwill and mutual assistance is the right thing to do. "Let your light shine" so that all men will see your good works, so that old Ontario will hold her proud position as the banner Province of this great Dominion in all the arts and sciences.



Ayrshire Bull.

Champion in Canada and the United States, 1912-1915.

Standing Field Crop Competitions.—This is one of the most important departments of a society and should be taken advantage of by every society to increase production now so necessary. Its usefulness could be further advanced if the judge could lay out his circuit so that his presence at any farm could be announced and he could address that gathering on the crop being judged, pointing out the good and bad features. It might take a little more time, but the educative influence would be worth the time expended.

District No. 7.

JOHN GRIEVES, Director: The exhibitions in my district were very successful, and I think great credit is due to the directors of each show for their good work and management, and it is not only creditable to the directors, but to the members of the fairs for their good choice in selecting good directors. It looks to me as though in many cases the greater part of the work and management is left to the president and secretary of the fairs, and that is a great mistake, as the directors should take as much interest in the work as the officers. The fairs I attended were apparently carried on with very good management and a great deal of work. One of the features that caused a great deal of enthusiasm was the children's parade, which made all the young people interested as well as the older ones, and a fair must have a good attendance to be a success. Another is the Field Crop Competition, which I consider one of the best things the societies have ever undertaken, and it is not only a credit to them but a great benefit to the farmers, as it encourages them to work their land better, and improve the quality of seed.

At one of the fairs I attended there was a display of nearly all the produce of the farm which caused a great deal of attraction.

District No. 8.

E. CHRISTIE, Director: District No. 8 comprises the Counties of Elgin, Middlesex, Huron and Perth.

In this district there are forty-one agricultural societies which hold fall fairs, and a large number of them also hold spring shows. Several have entered in the Field Crop Competitions and all report great interest taken in these, and if the time were extended for receiving entries for spring crop to the first of June, it is the general opinion that a great many more entries could be secured.

I visited the following fall fairs in my district: Exeter, Mitchell, Kirkton, Brussels and Thorndale. All these were favored with the best of weather, and the weather is a great factor in the success of all agricultural exhibitions. At all the fairs mentioned the indoor exhibits were first class, and those of all classes of live stock numerous and of a fine quality and were a great credit to the district in which these fairs were held.

At the Thorndale Fair the Rural School Association had an exhibit which was really splendid. It was the first exhibit of this nature that I had ever seen and the teachers and children deserve the greatest praise for its completeness. It was certainly instructive and of the greatest interest to all.

I visited two spring fairs in my district, Hensall and Clinton, and each was a success and both the exhibitors and the officers in charge are to be highly commended.

District No. 9.

A. F. ALLEN, Director: As director of District No. 9, I attended as many fairs as possible. The attendance of the Chatham Fair was very large. There was not as much live stock at this exhibition as I had expected to see in a place so well situated as Chatham. However, what it lacked in quantity was made up in quality. As usual the principal attractions were speeding in the ring, and a game of baseball also had many interested spectators. The Chatham Fair was a success.

The Essex County Fair was, as usual, first class in every particular. There were a great many entries in all kinds of live stock, and some very fine horses were shown. The grain and roots were above the average. Sir Adam Beck opened the exhibition, and his address was very much appreciated by those present, but the opening exercises were curtailed to some extent by a shower of rain. Sir Adam Beck purchased a number of horses on the grounds the second day.

The Leamington Fair was a decided success. There were a large number of entries in every class. The show of cattle and horses was excellent. The exhibit of roots and fruits was the best I have ever seen, giving one an idea of the resources of that locality which is justly termed the garden of Canada.

And last but not least, I attended the Comber Fair. The exhibits were above the average, especially in horses, which were the best lot I have ever seen at a small fair. Cattle, sheep and swine were all up to the standard. The show of poultry at this fair deserves special mention. The attendance was larger than it has ever been before. The attractions were a game of baseball and speeding in the ring. The speeding in the ring by a number of local horses owned by farmers in this locality was very interesting to the many people present.

The local fair is the one great gala day for the people of the rural districts, who meet and enjoy a visit together and friend holds fellowship with friend. This was the best fair from every standpoint that Comber ever had.

I did not see any unlawful games at any of the fairs I attended.

At most of the fairs I visited, I noticed that the ladies were very busy selling flags, etc., to raise money for the patriotic fund, and a good deal was got in this way. At the Comber fair which receives a grant of $129 from the Department there was raised the neat little sum of $500.

I met with several Indians while visiting the Chatham Fair, and on enquiry I find they do not get any grant or assistance of any kind from the Provincial Government, although at Walpole and Munceytown they hold fairs. I am informed by some who attended these fairs that their stock is very poor. The Walpole Indians say that the only assistance in the way of improving their stock were two bulls which they received from the Indian Department a few years ago. Would it not be a good idea for this Department to give these red men some consideration in the way of grants and supervision, and also education in the science of agriculture? The Department of Agriculture is doing great work in educating young white men. Why not give some assistance to our red brothers?

District No. 10.

FRED E. WICKHAM, Director: District No. 10 comprises the Counties of Grey and Bruce, in which there are thirty-six societies. For some reason one of those societies did not hold any fair in 1914.

On receipt of a letter from Mr. Wilson, our Superintendent, giving me a list of fourteen societies in my district that had not paid their affiliation fee for 1914, I immediately got busy and wrote those fourteen societies, showing them the advantages derived from being affiliated with this association; also the increased grants this association had been able to secure from the Government. I am sorry to say only five of those fourteen societies sent their fee.

One of the directors last year thought each director should be held more or less responsible for the fee from each society in his district. I would not care to be in favor of that, but I would suggest that this convention pass a motion making it compulsory for every society to become a member of this association.

I am glad to be able to report that the Field Crop Competitions are growing year by year. In this district twenty-one societies took up this work. Oats seem to be the favorite crop. Twenty-one societies took up white oats, three took potatoes, two barley, two corn, two mangolds, and one turnips. In all there were 466 fields in competition, and almost 2,000 acres. Only three societies took up the three crops, Kilsyth, Rocklyn and Walters Falls. Grain from the winning fields in oats and barley won first prize at Guelph Winter Fair. I am glad to say also that stock that was exhibited at the local fairs in this district was successful in winning prizes in the open class at Guelph. This is encouraging to those exhibitors, as no doubt they got their first lesson at the local fair.

Prize-Winning Ayrshire. Photographed after milking.

I visited quite a number of fairs and found them all in good working order. and all running a clean show. No gambling devices were found at any of the fairs visited.

Very few fairs suffered from wet weather. although there was a little falling off in attendance. due, no doubt to the outbreak of war.

The withdrawal of Departmental judges at the last moment came in for quite a lot of criticism. as a large number of the societies had to make a very quick choice in procuring judges and at larger expense. The society I represent paid fourteen dollars more for judges than if we had Departmental judges. and exhibitors did not get as good satisfaction in the end.

In regard to the proposed fifty per cent. reduction in grants to all societies, I have written to the Members of Parliament for Grey and Bruce, expressing our deep regret at this action, and urging that it be reconsidered, and if possible, rescinded so as to avoid the serious, if not death-blow to this struggling but important aid to agriculture, the fall fairs.

District No. 11.

W. J. HAMILTON, Director: District No. 11 comprises Muskoka, Parry Sound and Haliburton, in which there are twenty-four agricultural societies.

I wrote to the secretaries of the fairs who had not paid the affiliation of one dollar at the time of the Convention, asking them to remit their fees to the Treasurer, Mr. McFarlane, as soon as possible.

I arranged for a meeting at Emsdale, on March 20, 1914, and the majority of societies sent delegates. At this meeting we formed a district board and appointed officers. These officers called another meeting on December 20 to arrange the dates of the fairs so they would not conflict.

There was a resolution passed at this meeting asking me to bring three points before this Convention:

1. That the standing field crop competitions have been a great success in every part of the district.
2. That the departmental judges gave satisfaction and that they hoped this Association would urge the Government to send judges next year.
3. That this Association put forth every effort to have the grants of the Societies sustained, for, if the fifty per cent. is cut off our grants, it will mean that many of our societies will be put back where it will take years of hard work to bring them to the prosperous condition they are in to-day, and many of the smaller ones will be put out of business.

During the season I visited a number of fairs and found all enjoying exceptional success and increased exhibits.

In conclusion I wish to thank the officers and directors throughout the District for their kindness and hospitality extended to me during my term of office.

District No. 12.

G. H. FARMER, Director: This district being so large, it is impossible for any director to visit one-quarter of the societies during the fair, as the amount allowed each director for expenses, would not buy a single ticket through the district. Number 12 District should be divided into at least three with a director for each. I have tried to get in touch with as many fairs as possible and have visited a number and find them all doing good work.

The Societies in Thunder Bay, Rainy River, and Kenora that have taken up the Field Crop Competitions are doing much good in those districts, especially by bringing in a better class of seed. The Kenora Society has purchased pure-bred stock. Emo has organized a Potato Growers' Association, the members of which are growing one kind of potatoes.

Fort William and Port Arthur Fair was well attended. They are doing a good work for the development of agriculture in that district and the officers deserve much credit.

Throughout the Algoma District the fairs are doing good work, especially as regards school fairs and field crops. When the Field Crop Competitions were first started, about 200 bushels of mixed potatoes was the highest yield. During the fall of 1914 the acre that won first prize at Sault Ste. Marie yielded 560 bushels. This variety was "Davies' Warrior." During the fall of 1914 no fair was held at Sault Ste. Marie. The reason why it was cancelled was lack of funds and the inability to borrow sufficient funds, because of the war, to put up the necessary buildings. But good work has been done, a thorough canvass of the district was made, and about 750 farmers called upon by the Secretary. Prizes to the value of $2,500 were offered and plans for extensive improvement were made, and the officers consider that better work has been done than in any other year in the history of the Society.

From my observations as Field Crop Competition judge, I would strongly recommend for Northern Ontario that the competition in field crops be limited to not more than three or four varieties in each class, the societies to name the varieties. Then and not till then will the Field Crop Competitions be doing the work that it is possible for them to do.

W. Hickson: I hereby give Notice of Motion that I will introduce a motion at to-morrow morning's session of this Association recommending a change of prerogative for supplying Judges at School Fairs.

BENEFITS ACCRUING TO AGRICULTURAL SOCIETIES THROUGH FIELD CROP COMPETITIONS.

W. Hickson, Bobcaygeon.

When the Field Crop Competitions were inaugurated in 1907, it was almost impossible to get seed grain free from noxious weed seeds, so wide spread had the different noxious weeds become in Ontario. The first important thing these competitions did for the farmers who entered them was to cause them to clean their fields of weeds; and, more than that, they soon became familiar with the names and the best methods of eradicating weeds. This was forced upon every competitor if he wished to be successful in these competitions.

After these competitions had been tried by the best farmers in the different parts of Ontario, it became evident to those who observed results, that seed selection was of paramount importance, if the best seed grain and the largest yield was to be obtained. Most farmers use the fanning mill in order to get their seed grain, which is a good thing to do, but those who took a deep interest in these Field Crop Competitions soon saw that they must make a selection from the best plant grown in their fields—an ideal plant strong in character and true to type—and from this selection they were able to produce seed in three years that was hard to beat, and which yielded from five to ten bushels more per acre than could be produced from the ordinary seed grain.

The competitors who made this hand selection and followed up their work had in four or five years a large supply of large, plump, clean, pure grain with plenty of vitality.

After the second Field Crop Competition of the Verulam Society, we held a Seed Fair in the middle of February, and have continued to hold one every year since. The result has been that farmers came from different parts of the district and bought this good seed at high prices.

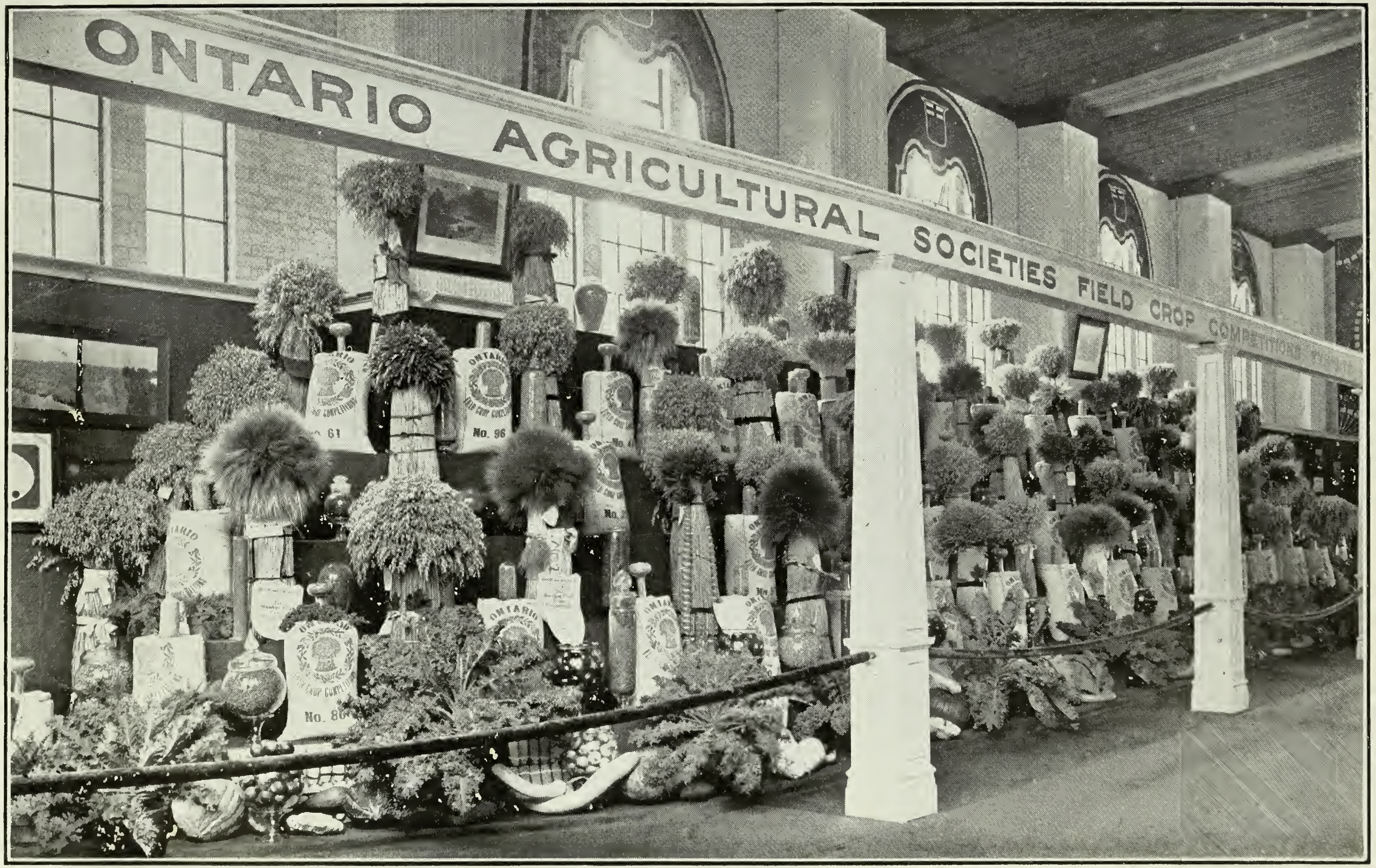


Exhibit from Field Crop Competitions at Canadian National Exhibition, Toronto, 1914.

Last year we sent 1,600 bushels of seed oats to different parts of Ontario and the United States at prices which ranged from 65 cents to $1 per bushel—we sent out a car load at 65 cents F.O.B. Bobcaygeon—but smaller lots, sent to different parts, sold at 75 cents to $1 per bushel, so it will be readily seen that oats that would yield from 60 to 80 bushels per acre sold at the foregoing prices is a paying crop to the farmer. This is not the only benefit, but the farmers themselves and everyone who purchase this good seed are increasing their yield per acre materially on their farms, so that this work has a much farther reaching influence for good than many think of. The fact that every agricultural society in Ontario has been given the chance to compete in three different crops in this Field Crop Competition makes this splendid agricultural movement have a very wide influence among our farmers. Our society held competitions in fall wheat, oats and corn last season, and there were forty-four entries in these competitions, and twenty-one substantial prizes were paid to the prize winners. These members were scattered here and there all over the district, and many farmers who were not in any of the competitions had fields alongside of these in the competitions and comparisons were being constantly made by these farmers themselves, and in this way good results accrue to farmers who are not in these competitions.

Although the competitions in which you may enter in each field crop have special benefits for the farmers, yet I think competitions in corn and potatoes produce the best results to those who take part in this good work. The excellency of the crop in either of these depends largely on the good cultivation that is given during the first two or three months' growth of these two crops, and especially so is this with corn. In all the cereals, cultivation is practically completed before seeding, but in corn if the crop is to be a success a high state, as well as the right kind of cultivation must be kept up regularly for the first two months or so of its growth.

Many of the farmers who grow corn for silage, select the dirtiest field on the farm for corn. They plow it as soon as the crop is taken off, then they cultivate it several times before the ground freezes that fall; in the spring the cultivation is followed up at regular periods, and only ceases for about five days at planting time. It is planted in hills from 40 to 44 inches apart by a planter, so that it can be cultivated two ways. This cultivation must be thorough if it is to be a prize winning field in a competition. So the farmer who enters the Field Crop Competition in corn and follows the foregoing method obtains two excellent results, viz., he grows a bumper crop of corn and cleans a dirty field at the same time.

Then, again, a society that enters in the three competitions distributes a good deal of cash in the twenty-one prizes among its members; and $225 is not the only amount of prize money they have a chance to win, as they have also a chance to win the generous prizes that are offered at Toronto, Guelph and Ottawa. Since these prizes have been offered for sheaves and grain from the prize winning fields of the Field Crop Competition, our society has exhibited sheaves and grain, and has won from three to seven of these prizes each year. This has not only been profitable, but most encouraging to the members of our society. At Toronto last season, we won two firsts on white oats and two firsts on fall wheat, and in the World's competition we won the $100 prize and gold medal on fall wheat. One of these exhibitors had won in all $133 in prize money on his field of fall wheat of about seven acres, before he had sold a bushel of it, and it did not cost him $5 in extra work to secure this amount of prize money. The names of these prize winners have appeared in the Toronto papers and in the Annual Report of the Agricultural

Societies of Ontario, and through this they have been able to get a ready sale for seed grain, which they may have to sell at good prices.

The only agricultural societies that have not received permanent benefit from these Field Crop Competitions are those which have not entered these competitions at all, and those that have entered, but did not make any special effort to secure good seed or to have the land properly cultivated before sowing it with seed. I know there are cases like the last one mentioned, where farmers make no extra preparation when entering the Field Crop Competition, and when the judge arrives to do his work all he can do is to score them all down low, and the seven highest get their prizes; but that is all the good it does. Such a competition brings no special benefit to the society or to the surrounding district. Then there are some societies that have been constantly changing their competitions; one year they compete in oats, the next year, perhaps they enter in barley and a third year they try wheat and so on, and the result is they never attain to a high state of efficiency, in producing a high class of seed grain. If a society enters in three competitions, as it can under the present regulations, then it should enter in the same three crops year after year until it attains a high state of excellence in each of the field crops in which it first entered. The society that adopts the policy of competing in a crop, till it has almost reached an ideal in it, will bring the greatest possible benefit to itself and the surrounding district.

I was secretary-treasurer in our own agricultural society before the Field Crop Competitions were inaugurated, and I have been secretary-treasurer of it ever since, and have been a judge in these Field Crop Competitions since 1908, so that I have had ample means to study the results from these Field Crop Competitions at close range, and the conclusion I have arrived at is that it will, if properly conducted, give a permanency and enthusiasm to the whole work of your society that could not possibly be gained in any other way.

In my opinion, I think this is one of the best results that accrue to the agricultural societies of Ontario, from these Field Crop Competitions.

I well remember, before these competitions were established, I had to canvass our village and district each autumn in order to get a decent membership in our society, and, when this was done, it was more like a village syndicate than a farmer's agricultural society; but since the establishing of these competitions and pure-bred stock divisions in our society the whole membership has to a large extent changed, and now the membership of our society consists of all the best farmers of the vicinity and of only a few in the village.

Instead of having to ask our villagers or the farmers of our district to become members of our Society, I have now nothing to do but look after the regular business of the Society, for all the good farmers in the whole community have come forward and joined the Society so that they might reap some of the benefits that are constantly accruing to its members.

I consider the Field Crop Competitions one of the best agricultural movements that have been inaugurated by the Department of Agriculture of Ontario, and I wish to congratulate our never tiring Superintendent, Mr. J. Lockie Wilson, on the amount of energy and enthusiasm he has thrown into this work to bring it to its present state of efficiency.

ADDRESS.

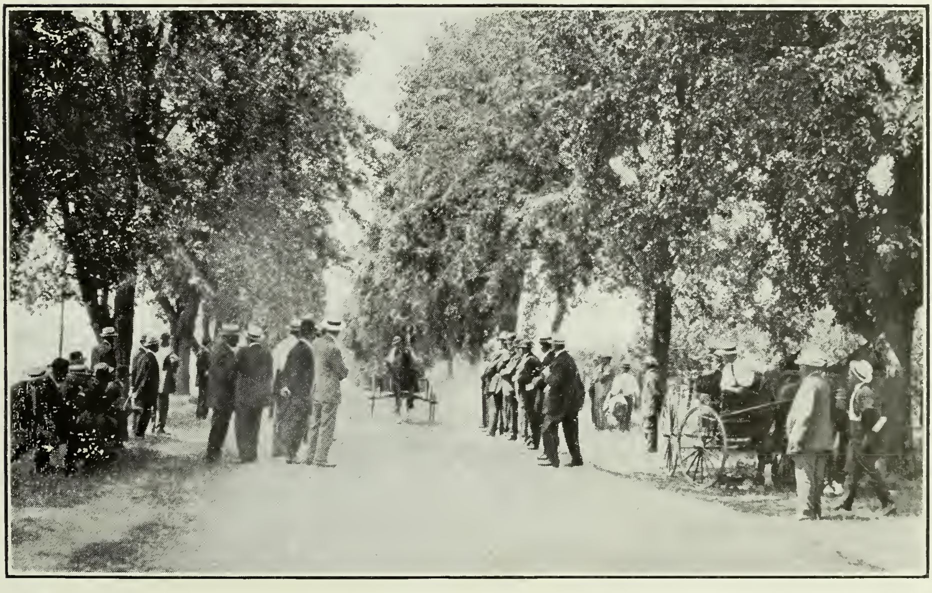
Prof. Geo. E. Day, Guelph.

There is a question which is often asked, and that is if the small fairs have out-lived their usefulness, and I have heard it claimed on a number of occasions by quite prominent gentlemen that the time has come when the small fairs should disappear, and that one good fair in each county is quite sufficient. Before I take up the answer to that question I would like to ask another one, and that is: "What are the real objects in holding agricultural fairs?" Of course, there is only one answer to that, and that is that the objects are to encourage and develop the various branches of agriculture.

In my limited observations, I have known of a number of what one would class as small fairs, that to my mind were really doing more real, educational work than a great many of the larger fairs, and the question as to whether the small fair has out-lived its usefulness or not depends entirely upon the character of that fair. There are fairs, no doubt, not only small fairs, but some which are, perhaps, more pretentious, which might, possibly, disappear, and the world would be very little the poorer; but there are a great many fairs, large and small, which are doing excellent work and should receive every encouragement. And, after all, supposing we had the small fairs eliminated, and the fair work concentrated, and there was one big fair in Canada—I am speaking now more especially from a live-stock standpoint—the difficulty would be to get the small exporter, or a man who has probably only one or two animals to come out to a fair of that kind. He is afraid to come to such a fair as that, whereas the small fairs near his door will encourage such a man to come, and you will find more real local interest in an exhibit of that kind than in some of the large fairs. Therefore, I think it would be rather a disaster if many of our small fairs were cut out, although some might, possibly. disappear with advantage.

In connection with fairs, of course, there are a great many problems, and I do not pretend to touch upon all of these which come up, because I am speaking from a live stock standpoint. These problems vary according to the localities. The difficulties encountered in one place might, perhaps be absent in another. Things that run smoothly at one particular fair present serious difficulties at other fairs. There are two common mistakes found at a great many of our fairs. One of these is the offering of a large special prize, and just one prize for some particular class of stock, or some particular class of exhibit. I might give you an extreme illustration; an instance which occurred at the Toronto Exhibition a few years ago. The Shorthorn Breeders' Association offered a $5,000 cash prize for the best Shorthorn animal. The object was, of course, to encourage a large exhibit. I will guarantee there was not one more Shorthorn animal on that fair ground than would have appeared there if that exhibit had not been offered at all. The prize went to a very wealthy American who did not need it. and who would have been there with his cattle anyway. It was just an amount of money thrown away which might have been used to encourage particularly the struggling breeder. because I think he is the man who desires special encouragement at the hands of fair boards. However, I do not think you will ever see a prize like that offered again, and it is to be hoped it never will be. That is an extreme case. but we still find a tendency on the part of fair boards sometimes to hang out some plum that way with the idea that they are going to attract a large number to the fair. but the chances are that it does not encourage one additional man to come.

Ottawa Short Course for Judges: Demonstration Lecture on Dairy Cattle.



Judges putting carriage horses through their paces at Ottawa Experimental Farm Short Course.

The object of holding agricultural fairs is not to distribute so much money among stockmen. A great many of our stockmen seem to get a wrong idea regarding this and they will tell you that this and that and the other ought to be done. But the object of these agricultural fairs is not to distribute so much money but to encourage a sort of friendly rivalry among the stockmen, to compete one with the other, esteeming it an honor to win rather than acquiring the money. Of course, the money is exceedingly useful in paying feed bills; but, at the same time, the main object of the fairs is to stimulate competition among the men who are handling live stock with a view to developing more interest in that particular business. That, after all, is the prime object of having a competition of that kind.

Then there is another mistake that frequently occurs, and that is the hanging up of what I might call a "fool prize," for something that cannot be judged satisfactorily. You get some gentleman in town who wishes to do something for the show, and he wants something novel, and he will put up a prize and offer it for some most impossible sort of thing, and the judge is supposed to satisfy the exhibitors. There is one thing that I especially dislike to run up against from a judge's standpoint, and that is a prize which brings the breeds directly into competition one with another. In the Western Provinces they are especially prone to that sort of thing, and it was my misfortune to run up against it pretty hard this last summer, although I have seen the same thing in Ontario shows, and I always think it is a mistake. Supposing it is a class of beef cattle, and you are judging Aberdeen Angus. A herd of those cattle come out and also a herd of Shorthorns and of Herefords. What kind of a position is a judge in, especially if he honestly thinks the Angus cattle should have the prize. He has to judge between two evils, either to place the prize where he thinks it does not belong or where he knows it should. The public know that he will give it to the Aberdeen Angus anyway. There are three objections to that. It is liable to create hard feelings among the breeders. There is a lot of room in this country for all the breeds of live stock which we have. I do not think that any one man is able to stand up and say that such and such breeds are decidedly superior to all the other breeds, but that is the impression the judge is liable to leave in a situation of that kind. I would like to see all prizes of that kind cut out, and the money used for a much more commendable purpose. As a judge I would like to appeal, especially to fair boards, to be extremely careful and clear in their wording of their rules and in their definition of the various sections. I will give you two or three instances I have run across in my own experience. One was in a certain village, and the class was called "Village Cow." It was not very far from Guelph either. I have no doubt the directors thought that was perfectly clear, and yet a difficulty arose at once. The question was asked, "Is this a cow owned in this particular village? Is it a cow owned in any village around here? or is it owned by any farmer suitable for village purposes?"; and the directors wanted me to interpret the rules for them. I said, "Interpret them yourself." How easy it would have been to put it the other way, if they meant that. "Best cow owned in the village of so and so." That would have been absolutely clear. But all that difficulty arose just owing to a little carelessness. Last spring I was at a small horse show, and there was a class for two year-old Clydesdale fillies, and the directors thought it was perfectly clear. When the class came out we found fillies entered which were rising two years old and would not be two years old until the spring. Then the trouble began. I said to the directors, "What did you intend this class for?" They said, "For two-year-olds." That was just a careless way of naming the section, the easiest way, possibly, but a careless way, and then they want the poor judges to define what they meant. How easy it would have been to have said, supposing it was a spring show this year, a filly foaled in 1913 or 1912. If they would name the year in which the horses were foaled, then there woud have been no trouble whatever. It would have been absolutely simple and clear. We run across that thing all along. In another instance there was a class called "Gentlemen Drivers," and when the class came out there were five or six road horses, and one man with a heavy harness horse, and a single carriage mare. The directors said they did not want it that way, and there was considerable trouble before we got that class straightened out. I asked them what they meant, and they were very slow about telling you, and we finally got the thing patched up. Now, if they had meant roadsters, it would have been easy to have said "Roadsters in Harness." Then there would have been no doubt whatever. Those are simple illustrations of how a little carelessness in the description of a section causes a great deal of trouble and a considerable amount of hard feeling. The one man who had the heavy harness horse was sore regarding the matter, and the same thing applied in the other show with regard to the village cow. We meet all kinds of trouble just through a little carelessness in wording the description of the class. This is not advice, but I have simply given you some illustrations of what I have run across in the course of my experience.

One of the problems that nearly all the small fairs, at any rate, encounter is the professional exhibitor who takes a flock or a herd and makes the round of the shows, and a great many fellows in the different sections are afraid to come out and show against him. Now, that man is to be commended for his enterprise. There is nothing against it. He is perfectly within his rights. Nobody can blame him for doing it, and, more than that, the show needs him. He helps out the show, because he is bringing out good stuff, although he discourages some of those other fellows who are afraid to compete with him. That is one of the most difficult things I know of in connection with shows. I have attended some fairs which have adopted the plan of allowing an exhibitor to take only two prizes in any one section. That always left the third prize clear. That is not a bad idea, either, because any man who is getting a first and second prize all round is doing fairly well. It helps to leave a little money for somebody else, although I do not believe a man should have it if he does not deserve it. It will help probably to get more men out. There is another way in which the difficulty might be got over to a certain extent. It is a plan which has been followed in a good many places with pretty good success, and that is to allow the professional exhibitor to show, but to reserve certain classes for amateurs. But the trouble is that in some sections the directors apparently do not study the locality in which their fair is situated. It is no use offering a special prize to amateurs for steers if nobody is breeding steers in that locality. The Directors should be closely in touch with what is going on in the locality, and try to place their prizes in such a way as to tempt some of these men to come out. It is very little use to offer prizes unless we get the people out to look at the stuff. There is not much use having a large exhibit of cattle, unless someone sees it beside the exhibitor. It is important to get the exhibitor out, and it is important the public should see the exhibits, and, if possible, learn some lessons from them, and that is one of the really serious problems in connection with Agricultural Fairs that I have run across, at any rate.

I believe that if we can hit some plan which will interest the boys and get them to attend the fairs we will get the fathers and mothers too. The fathers will follow the boys. If your boy is taking part in a competition, you will be there

Dairy Cattle Judges at Ottawa Short Course.

W. J. Squirrell giving pointers to Field Crop Judges.

to see it. At least I should be there if I could possibly do so. It seems to me that Fair Boards would do well to study that question a little. What can be done to get the boys interested? I have known prizes to be offered for the best of a certain kind of animal exhibited by boys under such and such an age, say under 16, so many points to be allowed for the animal and so many for the way in which the competitor had things prepared. That is the sort of prize which will put a lot of boys upon their metal. It depends upon the boy himself to a certain extent; the condition in which he has brought out that animal and the skill he has shown in exhibiting it, and after the thing is over, if the judge, who is an experienced stock man, can give these boys a little talk as to how to show an animal, and there are lots of boys and men, too, who do not know how to hold sheep, for the first thing they do is to grab the sheep by the wool, they think nature put the wool there to hang on by. If the judge took hold of those boys and explained to them how to hold that sheep, and how to train it to stand and handle it, so that they would get the sheep perfectly quiet, they would be performing a very useful work. They could instill into the minds of the boys a lot of valuable information that boys ought to know concerning which at present they know nothing.

There is one more thing that I would like to mention, and that is the possibility of judging competitions. We have had them in the past, but some Fair Boards have dropped them. If any of you Fair Boards' Secretaries are anxious to get a scheme I will send you the details of one I have in hand, where it can be done with comparatively little work. What we want in matters of this kind, if we are going to make the fairs a success, is for all to pull together and give every man a chance, and, if this is done, we shall find a marked improvement all along the line in agricultural affairs.

A Delegate: You suggested the desirability of getting the boys interested in the fairs. Are you favorable to the school fairs being held in conjunction with the agicultural fairs?

Prof. Day: Where practicable I think it would be a good thing. In some cases it might not be practicable. There is this advantage in having the school fair separate. In effect, the boys are allowed to run the thing themselves, and if the school fair could be so arranged as to allow the boys to run it, it would be a grand idea.

A Delegate: Would you object to allowing school teachers to be associated?

Prof. Day: Not at all, if there is work for them to do. Among the ladies you will find some of the best workers that were ever turned out.

A Delegate: Should the exhibitors be allowed to ask the judges questions, and to give their reasons for placing exhibits in the different classes?

Prof. Day: That leads to a lot of trouble, and perhaps to a little hard feeling. At the same time, in my experience, if a man asks for my reasons, I am always glad to give it. Of course, you do not do it unless you are asked, but I always think that it is a good sign when you can get men to ask the reason for a thing, when they cannot understand it. One of the discouraging things about a stock show to the onlooker is that many young fellows go to look at live stock, and, as he sees them they look very much alike, and he is no wiser. But, if the judge could give his reasons, that man would have learnt something. He might not agree in all cases, but he would see along what line that judge was working and, if questions were asked, it would be a grand thing, especially if the judge was diplomatic, and he could give his reasons so that they did not offend the questioners.

A DELEGATE: There is the question of appointing ladies on the Directorate. We have five of them on our society, and this year they wanted to appoint some more, and objection was raised that they could not appoint any more on the Directorate of the Agricultural Society.

J. LOCKIE WILSON: It may not be the fixed rule, but it is a good plan to get as many ladies on a board as possible.

A DELEGATE: In our society last fall we had a prize offered for the best two-year heifer over two years old and under three. There was a large exhibit and two or three of those entered had a calf. Would you call them heifers?

PROF. DAY: I would, but I do not know whether everybody else would. In Guelph, in the days of the Old Fat Stock Show, a law-suit arose over that same thing. You will find in prize lists prizes offered for two-year-old heifers in milk, and if in your prize list there is a class for heifers over two years and under three I would take it to mean that they might have had calves and might not. I would still call them heifers, even if they have had calves, but some people do not.

ADDRESS.

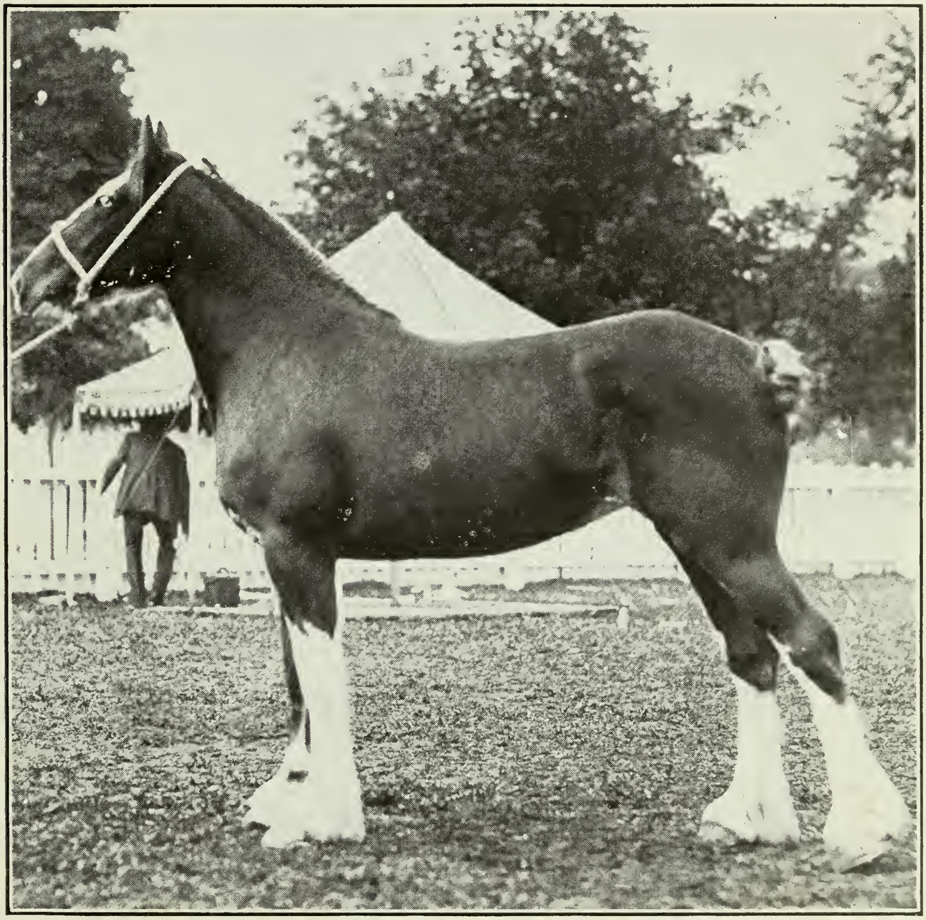
DR. G. C. CREELMAN, GUELPH,

I am pleased to be present and to have the opportunity of talking to you men who are in charge of our agricultural exhibitions in the Province of Ontario. I want to speak to-night about the Province of Ontario and its immediate relations to the Empire, because our hearts are all filled at this time with loyalty to the Empire. There are not 10,000 or 100,000 or 1,000,000, but 20,000,000 men mobilized to-night, some to fight on the side of the Allies and the British Empire and others for the Teutons. Many of them come from farms, and they have ceased to be producers. Many of them are in allied industries and the manufacturing of many things in which the farmer is interested, and for the lack of which the farmer would be badly handicapped. Many of them, however, have ceased to be producers, and all of them are consumers of agricultural food-stuffs; and, more than that, all of them are destroyers, in an agricultural way, directly or indirectly, as they are tramping over the fields of the farmers in those districts involved in the war. What does this mean to the farmers of Ontario? Food will be needed. Much food. Better prices will prevail. There is no doubt of that. But more than all, loyalty to the Empire first, last and always, demands that this year you and I, in whatever agricultural position we find ourselves—many of us are too old and cannot go to the war—must see to it that our loyalty to the Empire gives the very best that is in us during the days that are to come.

Great Britain has borne the burden of our heavy taxation. We must not let any of her people want for food. We must not sacrifice our live stock. I will say this, that he who sells a good heifer or cow for beef purposes or a good young brood sow for pork is neither fair to his own farm or true to his own country. There may be exceptions, of course, but I have put in the word "good" in both cases. But I question whether he who sacrifices a good animal for the high prices at the present time, when that animal would be capable of producing more in the days that are to come, is true to his own farm and true to his own country.

We must plan for the future, for I see these 20,000,000 men out of business, so far as production is concerned, and, although I am no prophet, I believe we have before us in Canada the greatest development the world has ever seen.

Sir Robert Borden said recently that Canada, at no distant date, would become greater in population and wealth than the British Islands at the present time. The war found us unprepared in many ways, but we quickly recovered, and business conditions are now fundamentally sound with Canada. We must have faith in Ontario, faith in Canada, and with one fixed idea in our mind that Canada is going to be a great country in the days that are to come. Our people can stand great shocks. I have been in Australia, New Zealand, the Philippine Islands, China and Japan within the last three months. Places of business were closed up in Hong Kong. I saw people in the City of Canton, a city of 3,000,000 people, who believed to a man that they would never be able to do any business again with England. I said our people will stand great shocks. We are not panicky and are not carried away. The Canadian people, as a whole, recover quickly from shocks, and from the standpoint of other countries, either in Europe or America, they are

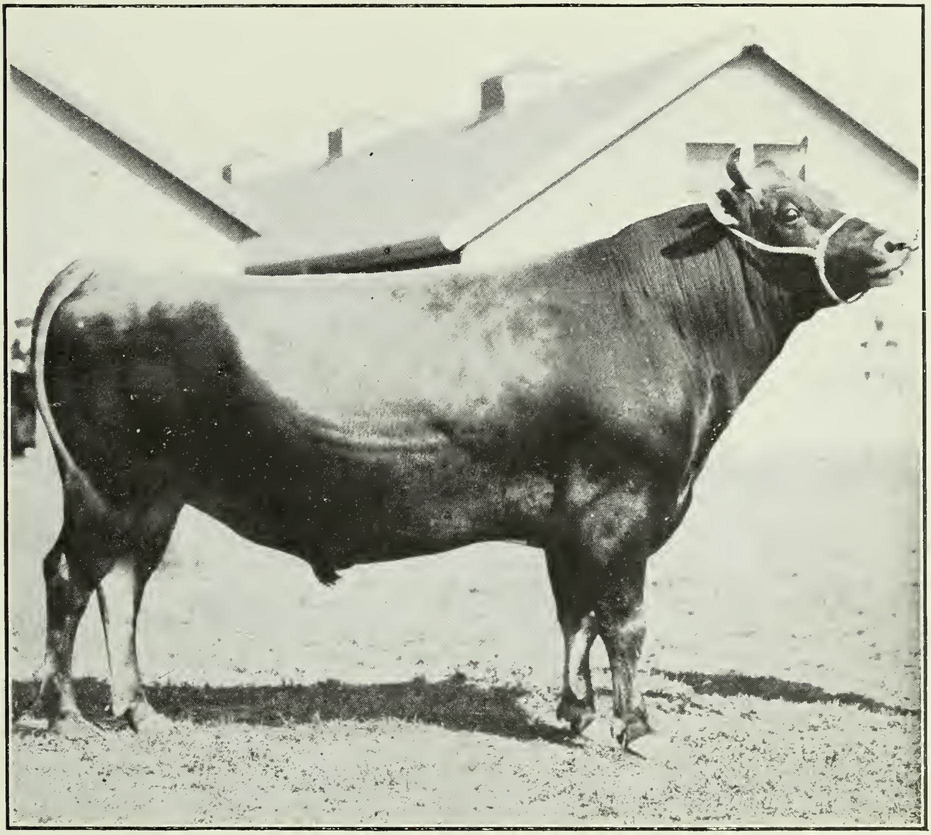


Clydesdale, two-year-old filly.

essentially earnest. When we get to business we get down to it, and it is remarkable that we should have ever recovered from the financial shock we suffered recently. When everyone is thinking of war we have not lost our heads; our people in the townships have not lost their heads. They are still the same energetic and essentially earnest people they always were. War is our first business until it is over. Three things are needed for a Greater Canada. The first is capital, the second is immigration, and the third enterprise. Great Britain will supply the capital, as she has ever done. Perhaps you noticed to-day that the Chancellor of the Exchequer was over in France negotiating a loan of several billions of dollars with the President of France. England is not only financing her own war but is lending money to other countries, so I do not think that we need fear that the supply of money will run out, so far as we are concerned, when it comes to procuring financial assistance for our farms and manufacturing establishments.

I believe that Canada, with her great natural resources, and her national and provincial policies, will attract immigration for a long time yet to come. Canada has an advantage over other parts of the Empire. Two of the finest countries I have visited are New Zealand and Australia. We must not confuse those two countries in our minds because they are very far apart, one a great continent and the other an island. In those two countries I found remarkable natural advantages. I found cows ten years of age that had never been out of the pasture field, had never been inside a house, and had never been fed. In those countries there is green grass all the year round with a splendid rainfall, and altogether an excellent country for farming. While I believe there are brighter times in store for Australia, there is a lot of splendid live stock there. Those countries can produce an enormous number of sheep and dairy cows, and they export large quantities of cheese and other commodities to fulfil the demands of the Home Government. Those two countries would be ideal places to live in, but they are a long way off, and it takes a considerable time to reach them, and in my opinion, in the days that are to come, great markets will be established with Canada when we have developed to the extent Sir Robert Borden predicts we shall; that is to the size and the population and wealth of the British Islands.

Then there is enterprise. We must supply the enterprise, you and I, and the enthusiasm. We home people must receive those people who come, and receive this capital, but we must do our very best to get the right people on the right kind of land; get them put into positions where they will not wear themselves out in trying to learn something the wrong way. You and I, who are the hosts of these people, must in the days that are to come look a little better after our guests. I would like to see in many of our farming districts more enterprize in the home. We have just closed a social conference at Guelph, the first of its kind ever held in Canada. A lot of the men and women of Ontario discussed there for a day or two the position of the boy and the girl in our rural communities, how they might be helped and what steps could be taken to induce them to remain in the country. All those things which were discussed at length lasted Friday, Saturday, and Sunday, and I was very much surprised to learn some things. For instance, six young ladies, some of them school teachers, and all of whom had taken a domestic science course, discussed from their standpoint reasons why some of the girls have left home and gone to the city, and why others felt disappointed with their life on the farm. One girl gave it as her opinion that some had left home, or were leaving home, because of the lack of improvements in the farm home, and mentioned as one of these the absence of running water. That could be obtained in the city, but on the farm it was conspicuous by its absence. That was given as the reason some young girls left the farm for the city, and no doubt they will now have running water for the rest of their lives. Others said the reason was because there was a lack of labor on the farm, that there was an absence of saving devices in the home. Another reason given was that there was not enough fun. That last reason was rather smiled at, but on reflection we older people remembered that there is a time called " youth," and there was never a truer saying than " Youth must be served." Young people have come to me and they have said, " I do not want to leave home or go into the city. I do not know anything about city life. I have no trade but farming, and I do not want to leave the home. But our neighbour's children are having no fun, and I am not having any fun." I think the time has arrived when this question should be seriously considered by the farmers of the Province of Ontario, and see if some arrangement can be made that when the herdman and the boy have worked a reasonable number of hours they should have some time absolutely their own, before they get discouraged and leave. I think that would be showing enterprise.



Prize-Winning Jersey Bull.

Then we must show enterprise in township affairs and in our fall fairs. First we should commence very early on a revision of our prize list. We do not give enough time to this. I think the appointment of a small committee of three or four good men to thresh the thing out, not to substitute a lot of radical changes, but to introduce a number of improvements into it, would be productive of much good. We must cut out from our prize lists everything but the best. In some cases one man has taken the prizes every year. Let us encourage more production in every way.

In conclusion, we have got to put more ginger into our work. We find a boy in the college with his eyes bright and sharp, watching everything that the Professor says. He is looked upon as a sharp boy. He is seeing things. You can see that boy has ginger in him, and he will become a leader of men. And so a live secretary, with a live board, all pulling together, is what makes a township show bigger than others. Then, again, do not blame the people or the other directors of the board for the failure of your show. It is up to you as director to make it or spoil it. I have not attempted to criticise your work, but get a little more enterprise, and if we at the college can help you in any way we shall only be too glad to do so

MR. FRANK YEIGH then delivered an interesting patriotic address illustrated with lantern views.

TREASURER'S REPORT.

The Treasurer's report, as given on page 6, was then presented. The Treasurer, MR. ALEX. MCFARLANE, said: There are a number of societies which have not yet paid the membership fee of one dollar. I shall be only too glad if the representatives of those societies will pay it to me at once. No delegate whose society has not paid its application fee has the privilege of voting, according to the constitution of this association.

G. C. MCCLEAN: At the present time there are a very large number of societies in Ontario that are not affiliated with this organization, and I think that more strenuous efforts should be made through the directors and through the association to bring every society in Ontario into line, so that they will all have an interest in our proceedings here. Every society in Ontario should be affiliated and have delegates here at this Convention.

ALEX. MCFARLANE: I received several letters last year asking me for the names of the societies which had not been affiliated, to which I replied. The directors looked after the societies in their districts, and got a number of them to send in their memberships.

A MEMBER: Would it not be well to send to every district director a list of the societies in his district that have not been affiliated? I received a list of twelve in my district that were not paid up, and wrote to them all. I do not know what the results were, but I wrote a good strong letter to each one of them.

J. LOCKIE WILSON: That is a very important point. It should be one of the duties of district directors to see that every society in their district becomes affiliated with the Central Association, because, after all, this is the great clearing house of agricultural societies, and any society that will say to a director, "What do we get out of that Central Fairs Association: what benefit is it to us?" is quite behind the times. Nearly everything that you have received in the way of grants and legislation has been obtained through the efforts of your Central Association here. If it had not been for your representations that $10,000 would never have been placed in the estimates for insurance against wet weather conditions; if it had not been for you, all these questions of legislation that were in the interests of societies would not have been passed. It is the duty of every society in this Province to become affiliated, and not only to become affiliated, but to see to it that they send at least one or two representatives to this Central Provincial Association, to back it up and secure such legislation and such grants as you may ask the Legislature to pass for you.

A MEMBER: The affiliation fee of $1 should be retained by the Department out of the Government grant.

J. LOCKIE WILSON: This institution has no power to compel the societies to pay their affiliation fees, but I am of the opinion that it is the bounden duty of every society in this Province to become affiliated with this Central Association which has, since its inception, done such excellent work for the local organization, financially and otherwise.

The Treasurer's Report was then adopted.

J. W. SHEPPARD: There is a matter I wish to bring before this Association before we proceed to the nomination of officers, and that is in connection with the remuneration allowed the auditors. In the auditor's report there are only some thirteen or fourteen items; it takes very little time, and I think we should endeavor to use a little economy in connection with our financial affairs. I also understand that the audit of our meetings costs $10, being $5 apiece. Every delegate here will realize that that is far too much to be expended for that purpose. I therefore move that the remuneration for the auditors of this Association be $2 each, not including expenses, railway fares, or anything of that kind.

A. F. ALLEN: I second that.

The motion was carried.

The election of officers resulted as on page 6.

Moved by J. W. SHEPPARD, seconded by A. F. ALLEN, "That this Association place itself again on record as being in favour of the Government grant to any one society in any year being limited to $500 instead of $800 as now provided by the Act, thus giving greater encouragement to the fairs located in farming districts not enjoying large gate receipts to enable them to pay larger prizes and so secure the lion's share of the Government grant, thus doing good substantial work in encouraging production in their localities, and that the attention of the Honourable the Minister of Agriculture be drawn to this resolution and effect be given to same by an amendment of the Act."

J. W. SHEPPARD: In introducing this motion I wish to be very brief, and state that I think it is only fair and just to the majority of the societies of the Province. Some twenty of these, I understand, received a Government grant of over $500 in 1914. The bigger fairs, which have large gate receipts, do not require the extra financial assistance that the Act gives them at the present time, up to $800. It would be only just and equitable and fair, a square deal to every society in the Province that is endeavoring to do good work in its locality, to limit the amount that any one society can draw from the Government to $500 instead of $800. This resolution was introduced some years ago and was carried unanimously. I do not know whether anything has been done with it, but I would ask the delegates to pass this resolution to equalize the amount as I have stated.

G. C. MCCLEAN: How many societies are receiving over $500?

J. W. SHEPPARD: Some twenty.

G. C. McClean: How much money would be saved by the change?

J. W. Sheppard: I do not know how much will be saved, but I think it will give the smaller societies a chance to get a larger grant, and that is right.

G. C. McClean: I have consulted the statistics for last year, and find that there are twelve fairs in the Province of Ontario that are receiving between $500 and $800. The total amount of excess over $500 that these societies receive is $1,853, which, if divided among the societies of Ontario, would represent a matter of about $4 that each of the smaller societies would receive. I want you to consider the effect that this reduction will have. There are some societies in this country that have come by strenuous efforts and hard work on the part of the directorate to a position very satisfactory in the districts where they are maintained, and they are giving to the surrounding districts between $1,500 and $2,500 a year in prize money. Speaking particularly for my own fair at Brockville, we are situated with one-half the the circle in the United States to the south, from which we get no support. The rest of our country north of Brockville that we draw from is partly rock, and we have a very sparse population in proportion to some of the other small places: and our Association is one which has attained some little success, and it is a matter of congratulation to a place where we have such a small population to draw on that we are enabled to distribute amongst

Jersey.

the farmers of that society about $2,300 a year. This is only done by the liberality and support of the people of Brockville, who are contributing largely in cash in order that the good effects of the Brockville Fair may be distributed as largely as possible. Now, the change that is proposed will amount to a very little money. The total is only $1,853 for the whole Province of Ontario, and, by passing a motion of that description, you injure institutions that are doing good work and are distributing a large amount of money among the farmers in the communities where they are located. I will read you here a list of the different societies. In the Northern Country they get double the grant pro rata that we in older Ontario get, where the fairs are better established. So that some of the amounts I am about to read to you will be accounted for in that way:—

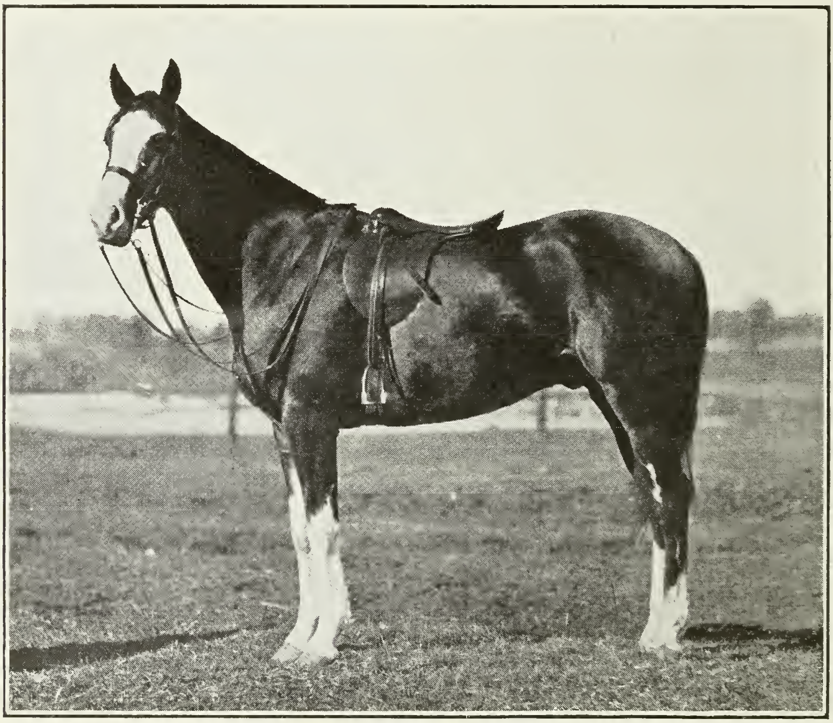
Central Algoma	$694 00	Woodstock	$509 00
Essex County	598 00	Peterboro	623 00
Caledonia	539 00	W. Algoma	800 00
N. Lanark	623 00	S. Victoria	702 00
Brockville	700 00	Guelph	736 00
Norfolk Co.	593 00	Markham	736 00

Now, the total saving that can be effected on this thing will be somewhere in the vicinty of $1,853, which, distributed over the different fairs of Ontario, will represent about $4 each. Are the smaller fairs to penalize institutions that are doing good work in order to have their grants increased by $4. What will be the effect? Take our own society as an example. We have been struggling along there from year to year. We have had bad luck at times; we have gone behind; our directors have worked like men, have put their names on a note and put it in the bank, and have been carrying quite a heavy contract in order that they might fulfil their obligations, and it is very easy to discourage a body of men that are trying to do their best for the industries and for the agriculture of the country, if they feel that their efforts are not being appreciated. And at the next meeting of the directors, when they come to consider the prize list, they will say that as the Government has seen fit to cut us off a part of our grant, we will make our prize list fit to the grant, and some hundreds of dollars which are now distributed among the farmers of that district will be cut off. When you have a good big prize list, you draw from a larger district than you do with a small prize list, as a general thing. I do not say this will be done, but I am showing that the tendency will be to say: "We will cut that prize list so that the amount that will be paid out will be $1,500, and in that way we will get the full benefit of the grant." Say that Markham and Guelph did the same thing, there is a possibility of cutting off from distribution among the farmers of these counties $1,900, just for the sake of sending the smaller associations the small sum of $4 each.

J. W. SHEPPARD: I have not had an opportunity of getting access to the statistics of 1914 as Mr. McClean has. Taking his figures, however, why should other societies represented here be asked to contribute $4 a year to the Brockville, Markham or Guelph Fairs? Why should you be asked to contribute a cent? Mr. McClean is using the argument that he will only take four dollars from you if you vote for his motion. If you vote for my motion it will give four dollars to your society. I think that the delegates of the societies represented here that are not earning the limit of the grant should vote for this motion. It is not going to hurt the strong societies. Brockville Fair surely can get along without the few dollars extra every year.

The small fairs and institutions are of greater benefit to the farmers and their children than big fairs like Brockville, Guelph and Strathroy which have their fair grounds filled with side shows.

David Evans: As one of the representatives of the larger fairs of the Province of Ontario it would not become me to sit idly in my seat and allow a resolution of this kind to pass by unnoticed. You are well aware what this grant is given for. It is for educational purposes, and the grant is equally distributed now because it is given on a percentage value, and if we take and reduce the maximum on which the grant has been given before, we will only increase the percentage of the society that was getting the larger grant and the society that was getting the larger amount will not have to do as much in order to get their proportion, because it will be on a percentage basis. You must remember that the great majority of the societies of Ontario only hold a one-day show.



Saddle Horse Type.

A Member: Two days.

David Evans: Where you have to go to great expense and provide buildings, there should be some consideration given to those larger societies who are endeavouring to do their utmost to develop the agricultural interests of this Province. I know I am in the minority: I know as well as you do that the greater number of societies are the smaller ones, but you are all ambitious. There is not one of you that would not like to get $800 if you could. You can get it if you put forward the proper efforts. It has always been the hope of Strathroy that we will reach the maximum $800, but, unfortunately, through wet weather we have been cut down $30 or $40.

The motion was carried.

Moved by W. HICKSON, seconded by T. ROBERTSON, "That this Association strongly recommends that the prerogative for fixing dates for school fairs in Ontario, be in the hands of the Agricultural Representative of the District, and where it is convenient to hold them at the same centre as the fall fair, then they should be held on the first day of the fall fair of that District." The reason I make that motion is this, a representative comes around and arranges for the fall fair. He knows all about them; he distributes all the seeds, grain, etc., and knows conditions thoroughly in that district. The result is that in our particular district we held the school fair in conjunction with the fall fair two years ago. It was a great success. Last year the Deputy Minister would not allow it to be held on the same dates at all, and the consequence was the school fair was a failure to a great extent. I would not say to hold it on the second day or even the third day of the fair, but on the first day, because they have not a large crowd on the first day, and the children can have all their games and everything that is necessary in connection with the school fair, and the farmers are there and see the exhibits of the school fair. The school fairs are a good thing and they should get all the encouragement possible. Another reason, the schools are closed for the fall fair and if you have to close them twice it is very inconvenient.

The motion was carried.

At this point the new President, Mr. J. C. STUART took the chair.

DUTIES OF DIRECTORS AT FAIRS AND EXHIBITIONS.

WM. SCARF, DURHAM.

What I am going to speak on is principally facts which I have noticed in the journeys I have taken through the Province attending the different fairs. If you will look over your programme you will see that members of the executive have been selected to take leading parts in the different discussions. Every man you have elected to-day will be able to take his part a year from to-day. The subjects will be selected for them as has been done this year, and each man will do his best. One of the reasons this subject was allotted to me was because it was thought that, probably, I had seen some things as I travelled through the country that would be of interest to you.

In the first place, we will deal for a few minutes with the election of a president. A man told me a few months ago that no one should be president of an agricultural society who was not a farmer. I am going to prove that this is not always the case by facts. I am going to mention some fairs that have been a success which had not a farmer at the head of them, and I am going to mention some fairs that have been a success which had a farmer at the head of them. A man should not take the presidency of any society who calculates that he is going to work for it only two or three days in a year. If he does that, the society is likely to go to the wall. I am going to tell you of one society that is near me and which has been changing its president from year to year. I sometimes think that is well. In this case, a doctor was elected president after a great many farmers had tried the presidency and failed to make a success of the show. They used the skating rink as their hall. They were not making progress. This doctor got in, and he was a fellow that made everything go. He said "I am going to make that society a success." And he said to the directors that gathered around him, "If you do not work, next year we will have officers who will." This happened eight or nine years ago. To-day they have fifteen acres of land paid for and beautiful buildings, and he told me last fall when I attended the show that there was not a dollar of debt on the grounds. That is a case where a doctor made a success where a farmer could not.

I will come down to another show in Shelburne. I have been there a great many times. A farmer there is president of that society, and has been for a number of years, and he has made that society one of the most successful in that part of the country. He gives so much time to the work of the society, although he has stock of his own, and he has made it a success. It does not make any difference what the occupation of the man is who is president, if he is a worker. He may be a doctor, or he may be a farmer; it matters not. If he has the right stuff in him, he is going to make a success of the society. The question arises as to who shall be elected on the board of directors. We do not all agree about that, and I am sorry that very few societies agree with me in having a lady on every board of directors. At nearly every society you will see the most attractive exhibit at that society put up by the ladies. If you have not a lady the consequence is that you have a lot of directors who do not know what kind of fancy work they are giving prizes for, and they merely repeat the prize list of the previous year. The articles may have gone out of date altogether. Men do not know about those things. If you had only one lady on every board, I believe it would take a great deal of trouble off the men's hands.

I know of a show a few miles out where the wife of every director that is elected is a member of that board the same as he is. If he is not married he has to get married right away. You would be surprized to see the effect it has on bachelors, because the women know when a bachelor gets on there he is expected to be married, and the consequence is they are after him directly he gets on. Now, I am going to deal as briefly as I can with boards of directors, and if you have any suggestions to offer, bring them up and we will try and discuss them. What is the duty of the board of directors? Is it to stand around until next year and go back to the electors again and say "We have done well," and ask them to elect them again? I do not think the board of directors of an agricultural society should be elected again if they have not done good work. A great many directors who are elected at the annual meeting never think anything more about the society until show day, and then they make a little fuss. I do not believe men like that should be elected again. One lazy director is likely to spoil the whole board, because one director will say "Mr. So and So did not work: I did work and he gets as much credit as I do." In one society I know of, as soon as the directors are elected, the president and first vice-president choose sides, and the side that secures the least number of members during the present year has to treat the others to an oyster supper. One farmer director last year got twenty-five members. and others did almost as well.

Another good method I know of is at the annual meeting for the secretary to read out the directors' names. "Mr. Smith secured ten new members, Mr. Johnston eight. Mr. Wilson six. and so on." This shows to those present the directors who have been working. and those who have not. with the result that these latter are dropped and workers substituted for them. That is a way to increase our membership. In some societies every director is furnished with ten membership tickets, and they are expected to sell these and return ten dollars to the treasurer. It is a poor director that cannot get ten members if he works. In other societies when you pay your dollar you get four tickets for admission to the society. You may say the society gets nothing out of it, but I will show you how it works. Suppose you only have 100 members this year and you give each of them four tickets. That will give him, his wife and two children probably free entrance. Suppose it comes a wet day and you sold 200 of those tickets; you have 200 dollars anyway, so you are not losing anything. These are suggestions I am throwing out, and if there is anything in them I would be glad to have them discussed.

Holstein-Friesian.

Another thing with regard to exhibitions, it does not make any difference how straight a director tries to act, there are always some men who think he is crooked. That is my experience. There are always some who think that if there are any favours going, the director is getting them. A director should try to act as conscientiously as he can, and he should not do anything to throw any reflection upon himself or any members of the board. This is what I mean. A great many directors would like to get first prize in some classes, and when a judge is appointed, they may not say anything, but they look as if they might have said something. I have been on a show when a director was very kind to me, and I thanked him for it. He said, "My number is sixteen all through my exhibits in the hall." I may say that sixteen did not get any more than what he was entitled to. That little hint did not look very well. I thought it was a reflection on that man and on the society.

It is the smallest shows, sometimes, which are the most careful and straightforward. A society which has a very small membership asked me to go there and judge their stuff. They had a very large hall and a splendid exhibit. When I was shown into the hall, I asked if there was nobody to go with me and the reply was that no one was allowed in the hall till everything was judged and the prize tickets put on." That is a splendid way. The judge does not know who the exhibitors are in any of the classes.

Still, I do not think there are many really dishonest directors in our exhibitions. During a period of twenty-one years I have had only one man tell me when judging that I had to give a prize to so and so. There was a very valuable prize offered at a certain show, and I was told by the secretary of that show where I had to put that prize. It did not go where it was intended.

That is my experience in the years I have been judging. I have attended a great many shows in this country, and I have made hundreds of mistakes. I do not believe there is a man who has judged in a show ring who has not made mistakes; but, if no one goes in with the judge and a mistake is made, there can be no reflections; the whole responsibility would come on the judge, and the directors could not be to blame when they were not with the judge.

It does not make any difference what show you go to, from time to time, if any of the exhibitors are in the hall, there are always mistakes made.

Then, again, when it comes to the outside part we have a good deal more to say about that, because you all know there are so many what they call "horsey men" in every show, and they must be around the horse ring, and, as a general thing, if there is an exhibitor in the horse ring, he cannot keep away from the judge in some way or other. That is another thing that should not be allowed in any show, and I believe the directors when they meet and appoint men to look after the different departments of the show, should ask a man before they appoint him, if he was going to show in that class, and, if he says he is, they ought, if they have not got a man on the board who is not going to show in that class, to call in an outside man.

Moved by DUDLEY L. HILL, seconded by GEO. W. DODGE, "That whereas the Government grant is supposed to be allotted to the various societies for the purpose of aiding them in their work and promoting the agricultural interests of the country; and whereas the present system works out to the advantage of the large fairs and does not adequately help the smaller ones; resolved, that the president appoint a small committee to go into the whole question of the allotment of the grants and report at the next annual convention." Carried.

LADIES' WORK AT FAIRS.

MRS. J. F. MCGREGOR, ALEXANDRIA.

It gives me much pleasure to be here to-day and to see so many people interested in the welfare of the agricultural societies of Ontario.

For the last eight years I have been sent out by the Ontario Department of Agriculture to judge ladies work, and while I found much that was beautiful, I frequently have to judge work by amateurs, who are always proud of their first piece of fancy work, who fail to see the defects in it, and who take it to the fair expecting that it will take a prize, without stopping to consider what it has to compete against. If they do not win a prize with it they get discouraged and stay away the next year, instead of making another effort with something new. They make a great mistake. Of course, it is very hard for young people to do very much in competition with those who have been making work for years, storing it up until they have several trunks full, and making a tour of nearly all the fairs within a hundred miles around them. This I do not think right, but they get the prizes and keep the young people out.

Much could be said on the subject of my address, because there are so many different kinds of fancy work. Sometimes the material used is very poor, and, no matter how well the work is done, it is still a poor piece of work. In order to get the best results in all kinds of embroideries and laces one should use the best material that can possibly be obtained; it costs a little more, but the work has a better appearance and that is what the exhibitor wants.

Holstein-Friesian.

It would take a long time to say something about each kind of work that I see at fairs; but if each exhibitor would look through her work every year, putting aside all that has been used, mended and poorly laundered, just showing her newest work, I am sure she would be better satisfied, and it would help to improve the exhibits at the fairs at which she shows.

Just a word as to placing initials or monograms on a long or square tablecloth. It is best to place them about eleven inches from either end of the table just beyond the salt-cellars. In this position it is less likely to be covered by dishes than at any other point, and shows to better advantage.

Care also should be taken in laundering all kinds of work; no starch should be used nor a very hot iron, for this takes away a great deal of the beauty by giving the work a flat appearance.

I will take Renfrew as an example of an exhibition where they do not stand still, but have adopted up-to-date methods in respect of arranging the work in the main hall. They have three or four lady directors, who receive the work from the exhibitors and classify it, and see that it is entered in its right class. When the judging commences one of the directors places the work in its proper class, making their show-room a real "Fairyland." They have also made it a rule for the last few years to give the preference to the newest work, which certainly has improved their fancy-work room, for last fall most of the old work had disappeared. If each society would adopt the same methods, and encourage the newest work, the ladies' department would be much improved, and it would encourage the young people, who are now afraid to show their work.

In conclusion I would say, and I am sure you will all agree with me, that a fair would not be a fair at all if it were not for the ladies' fancy work.

A Member: Mrs. McGregor has suggested a lot of good ideas in the address she has given us. She has been at our fair for a number of years, and I have heard with pleasure her paper this afternoon.

EXHIBITING AND JUDGING OF CHEESE AND BUTTER.

G. G. Publow, Kingston.

It is a pleasure for me to be here and offer you any suggestions that may be of benefit in the exhibiting of cheese and butter at the fall fairs. From what I have seen in my travels amongst the fairs there can be some improvement. There should be a greater object amongst exhibitors than that of simply getting prizes. We should have some higher motive than that. We should make the work advertise our dairy products. I find that at most of the small fairs, if the weather is warm, the butter exhibited is not in a very attractive condition. It is not in the best condition to enable the judges to give a fair judgment. There should be some provision made for keeping the butter in a suitable condition for judging at least. When the prize butter is sold, very often the men who get it are very much disappointed as the butter is practically bad before it leaves the place. To the fairs that call for exhibits of butter and cheese, I would suggest that they make provision of some kind whereby the butter can be kept sufficiently cold to keep it in a condition for judging. I have taken the matter up with Mr. Ruddick and Mr. Barr at Ottawa to see if they had anything to suggest, and they have plans for small refrigerators that can be used at small fairs. They are not very expensive and the goods can be shown with safety, and made attractive as well. Present methods of showing butter are one of the weakest points in connection with this part of the exhibit.

Prize lists should be up-to-date. When you ask for exhibits I would suggest that you cut out roll butter. For instance, we find prizes given for roll butter, print butter, and in crocks or boxes as the case may be. There is not very much roll butter being put on the market at the present time. It is usually in the form of prints or in crocks or tubs, as the case may be, because very often the butter that is put in rolls comes wrapped up in almost anything, and it is not very attractive in appearance.

Then, I would suggest in reference to cheese, that you offer special prizes, and see that it has a prominent place. I have gone to fairs where it was mixed in with other products. Dairy products are things that should be kept in a place by themselves, and made as attractive as possible in that way. Another thing I would suggest in connection with the judging of the butter and cheese is that the judges be supplied with score cards for the purpose of making their decisions as educational as possible. A uniform score card could be cheaply provided at probably a cent or half a cent apiece, and when the judge gives his awards, let him show the defects in the butter or cheese, on the card, and make it educational to the exhibitors, and, possibly, where a quantity of cheese and butter has been exhibited, the judge might be able to give a five or ten minute talk on the defects or needs in connection with that, and in this manner it would be a considerable benefit to those who are exhibiting.

I would suggest to the directors of the fairs that they make a special effort to encourage the exhibiting of dairy products in this country. Dairying is one of our principal branches of agriculture, and we should give this a little more attention, and do what we can to bring before the public of this country the value of dairy products.

I would also suggest that in the prize list, a prize be offered to the ladies for the best collection of fancy dishes manufactured from cheese.

QUESTIONS AND ANSWERS.

Q.—Is it right to have a minister president of an agricultural show board?

A.—Yes, if the members so desire at the annual meeting.

Q.—May we give as prizes such books as, Chemistry of the Farm, Farm Weeds in Canada, Farm Management?

A.—Yes.

Q.—Cannot the hour of holding the annual meeting be made optional; evening meetings are often better attended in some parts of Ontario?

A.—The law would require to be changed.

Q.—Why do the agricultural societies go outside of their own profession for a president. Do they thereby acknowledge their inability to fill such positions?

A.—The members of an agricultural society are supposed to be the best judges as to whom they elect as presiding officer.

Q.—Would it not be advisable to change acreage in corn in connection with the Field Crop Competition from five to three acres?

A.—It will be considered by the Department.

Q.—Is a mare eligible to compete in a draft team and as an agricultural brood mare?

A.—A draft animal cannot compete in an agricultural class.

Q.—Would you recommend to have an executive committee to transact the business of the agricultural society along with the president, vice-president, and secretary, in a society where there are twenty-five directors?

A.—The board from among themselves may appoint an executive committee of not more than five members to perform such duties as the board may specify.

Q.—Would it be possible to extend the time for holding the Spring Seed Fair until some time in the beginning of April so as to allow the holding of the Seed Fair and Horse Show on the same day, March being too early for our district?

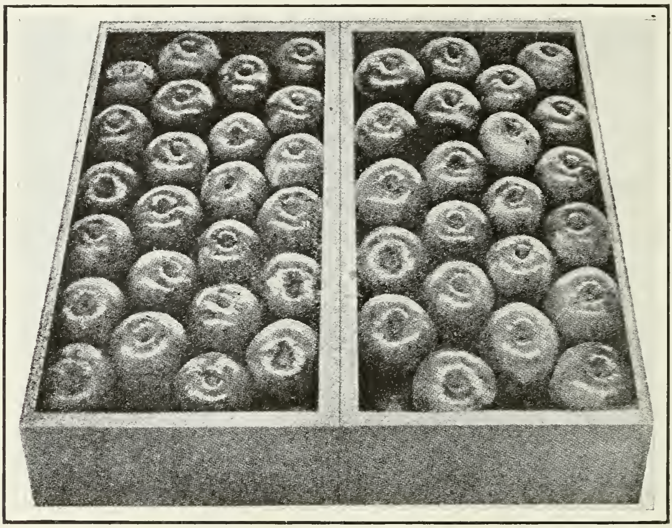
A.—Yes.

APPROVED METHODS OF EXHIBITING FRUIT AT FAIRS.

W. H. Bunting, St. Catharines.

I feel somewhat diffident in addressing this large assembly of representative men gathered from all parts of this Province. We are living in, perhaps, the most stirring and strenuous period in the history of Canada as a nation and are an integral part of the great British Empire and this is a time for the consideration of great and weighty questions which materially affect, not only our well-being and prosperity, but also our very existence as a nation and a freedom-loving people.

As has been stated over and over again those who for good reasons tarry by the stuff may be carrying their share of the responsibility of the Empire and be adding a little to the sum total of the public welfare, and so in consideration of some of the duties of our daily round of duty we may in a measure be doing what we can in our own sphere of activity.



Neatly packed apple exhibit.

Fairs and exhibitions have amongst other reasons for their continued existence and cause for support one or two features that stand out prominently from the rest. One object is to educate the farmer to emulate the best efforts of his most successful neighbor in the production of those things for which this particular district is most noted. Another object is to bring prominently before the public at large the possibilities and adaptation of our various districts and counties for the growth of agricultural products of various kinds. While there are many other features, these I think are paramount.

The class of farm products in which I am most particularly interested is not confined to a restricted area of this Province, but while some sections are perhaps more favourably situated than others, there are very few parts of the settled portions of this Province which cannot produce fruit of at least some of the hardiest varieties of excellent quality. So that, after all, we are all interested more or less in fruit growing. There is no other product of the soil which gives us a more favourable impression of the climatic conditions of a district, as a good place in which to live and make our home than the luscious and beautiful fruits which are growing in so many parts of this splendid Province.

If we grant that fruit growing is an important part of the activities of many of our farmers from one end of the Province to the other, the exhibition of fruit should have an important place at all our county fairs, and the best efforts of the directors should be given so that every year a display worthy of the district may be brought together and displayed in the most attractive manner. There are a few points that may be touched upon in this connection.

First, the prize list should be so arranged as to bring out the largest variety of the standard fruits, for it is a lamentable fact that there are altogether too many varieties of nearly all our fruits grown in the average orchard on our farms in this Province, and the past season gave us a real object lesson in this respect as far as apples were concerned, for while thousands of bushels of apples went to waste in many sections on account of lack of purchasers, there has been all season and still is a good demand for our best varieties of apples of first quality. We are producing too many kinds of fruit of unknown and doubtful value, and our efforts should be to discourage promiscuous planting and confine the planting to standard varieties of known and proven value. Our prize lists should be arranged with this object in view.

Then the prize money should be arranged so that as many exhibitors as possible may participate in the funds set apart. Very often exhibitors are in very close competition, and the judges would like to award prizes, but they are debarred because there may be only first and second prizes. Now, wherever possible there should be a greater division, and third, fourth and even fifth prizes be given as an encouragement to exhibitors.

Then, as to judges, I am glad that the Government adopted some time ago the system of sending out departmental judges, and also the practice of getting those judges together at stated times for instruction and comparison in methods, and relative values of the various items which enter into the sum total of the standing of an exhibit. There has been a wide divergence of views in the past, and this has been quite as prevalent in the judgment of fruit as of other things, and the adoption of score cards and uniform valuations has done much to remove much dissatisfaction that at times has existed. If you cannot have expert judges, by all means insist on the score card as a basis for judging, and let the exhibitors know that it is being used. I think that, as far as possible, exhibits should be confined to the county or district, and that the exhibition should be the product of the finest. Many a young man has been deterred from displaying his fruit at our township and county fairs on account of the travelling professional exhibitor with whom he is obliged to compete. Do everything you can to bring out the exhibits from your own people.

In counties and districts where fruits are grown in commercial quantities, the matter of commercial package exhibits should receive greater attention than they have in the past. Then, there is the matter of staging and labelling the fruit display. As far as my observation goes, very few of our exhibitions take sufficient pains to stage or display the fruit so that the public can easily and readily distinguish varieties and kinds at a glance as they pass by. Not only should they do this, but we might go a step further in this direction and by means of clear and legible cards impress upon the public the good qualities and the best seasons for many of our standard fruits, and thus encourage their more general use.

The advertising campaign inaugurated by the Minister of Trade and Commerce last fall had great and far-reaching results in increasing the consumption of fruit, and at our fall fairs we could do a great deal in this way by judiciously placarding the fruit.

Sometimes we fear we are reaching the position of over-production, in some of our kinds of fruit, but I am firmly of the opinion that with reasonable care in the selection of the fruits we grow, and a rational and comprehensive exploitation of our national markets, it will be a good while yet before fruit will cease to be one of our most profitable farm products.

The President appointed Messrs. Dudley Hill, David Evans and J. W. Sheppard as a Committee to go into the matter of the equalization of the legislative grant to agricultural societies.

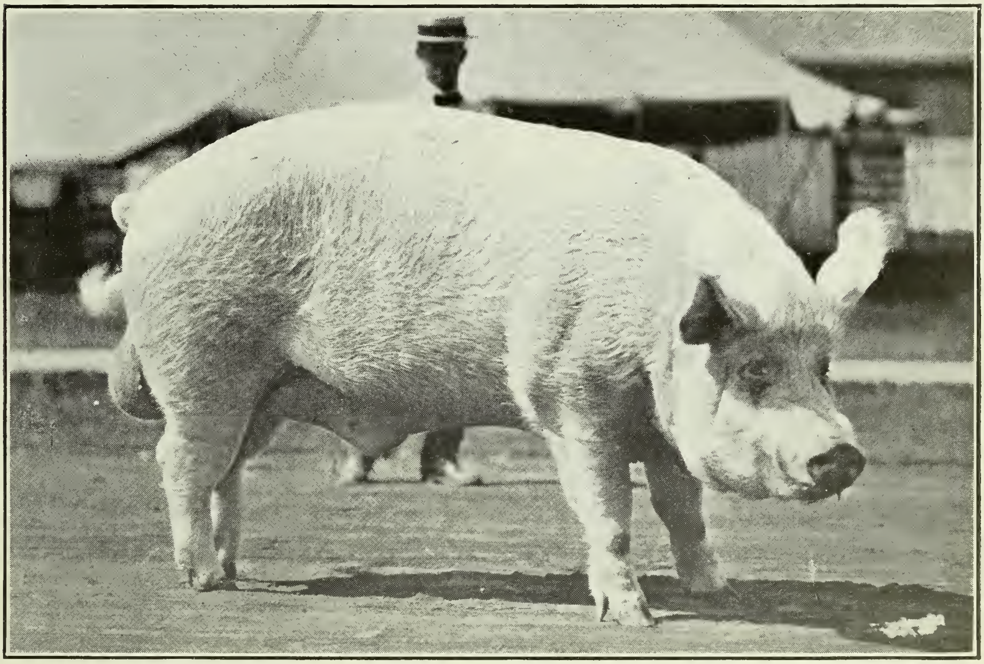
EDUCATIONAL EXHIBITS OF POULTRY PRODUCTS.

Miss Yates, Port Credit.

One of the most pleasant ways of learning anything is to attend fairs and exhibitions. Looking back over my own experience with poultry products, I can only say that the ideals set up in my mind from the study of exhibits at the very large European fairs and shows, have remained fixed with me for a period of years as giving me a standard to aim for. Observation, after all, is one of the best ways of grasping any concrete problem. With regard to the poultry products in this splendid young country, far be it from me to say much to their detriment, but I would like to raise the standard during this period of encouragement to more production. To raise a standard for better production, we must first of all think of what we want, and I am anxious to be very brief, and yet to leave a message with you for consideration during the coming year. What is it that we want in our poultry products for Canada, for Ontario particularly? We want, chiefly, a better preparation for the demand of the market. We will take it now for granted that the production end of it is fairly satisfactory. How many excellent flocks of poultry destined for the market have been ruined in their final stages of preparation for that market. It is often said that a man has no need to live beyond his opportunities, and if he prepares for the local trade, he need think of nothing more; but in dealing with a subject of this kind, the educational value of the exhibition of poultry products, surely, we want to reach out towards the ideal as to what the district or the county or the province or the country can do when it comes to stepping out into the markets of the world, and the best methods of showing and of preparing for show our poultry. The preparation is so often what is wrong. We want to teach in the dressed poultry an absence of food in the crop and intestinal tract, the proper methods of completing those birds, the proper drainage, as we call it, and the best methods of packing. How many packages have we seen opened on the markets of Europe that have been a scandal to our young Dominions over the seas, opened in old London to compare with poultry from this modern country now suffering so much? Who knows anything of the Belgian production of exquisitely prepared choice products in poultry for the connoisseurs of the world, in the clubs and hotels of Old London? The market is there, but the preparation must be better. What we want to teach is better preparation. How are we going to teach it? By means of your splendid organization of fall fairs.

An education taught by organization, or rather by organizations intending to teach, must either lead or follow or go alone, and those who go alone are generally the cranks. I would like to see your association stepping forward in the van as the leader of this great movement to improve the output of the farms.

Personally the dressed poultry section of your fairs interests me and fascinates me more than I can say. It would be idle to deny there has been any improvement, because having been with you here in Ontario for a matter of nearly nine years, I have seen year by year a distinct improvement at the fairs. But how shall we educate and develop further? I would say, attend to your classifications a little better. In all fairs poultry is not welcome; an exhibit of dressed poultry is not welcome. It is tolerated in many places, but scarcely welcome. Make it an attraction. Attend to your classifications a little better. What is the commercial demand? Find that out. We have three classes now, the broilers, the friers, and the roasters. Teach what is needed to fill those demands. We have the comparative values of the different breeds for these three purposes. We can show that very nicely in our dressed poultry sections. We have the size and weight for those three purposes; we have the matter of age; we have the matter of sex, and nothing distresses me more than to act as judge in a class where pullets are competing against cockerels. These points in classification should be considered. The arrangement of the classes is not good even at the best of our fairs in this Province. It is not good for these reasons: The birds are densely crowded together; there are few spaces left



Yorkshire.

between the different classes; it is hardly possible to take a class up together through the dressed poultry section and teach the farmers or poulterers anything, because of the crowding. You can scarcely tell where one class begins and where another ends. I am not referring to a difference in names; anyone can tell a goose from a turkey. Separate them out a little, give a little more space. In thinking of the finest method of spacing, I am reminded forcibly of the shelving methods, the retrogressive shelves, where the birds can be raised up with spaces between each. You may walk down the aisles and corridors at our largest shows and see and study each individual fowl separately. We have not always the funds to allot to that. Shelving paper placed in a fancy manner, add to the appearance and proper dressing, cleanliness and that beautiful bloom that is on the flesh of birds handled delicately, handled in a clean manner, properly drawn —that bloom, that should be encouraged to compete in the finest markets and the most paying markets at our command.

I urge you to consider a better spacing and a better labelling, a better placarding, so that it may be possible to walk into the dressed poultry section and see what are the names of the varieties. I have seen gold medals competed for at the Royal Agricultural Society Show in England by the wonderful grades of Indian Game Dorkings, and on every side flanking that would be classes of pure Dorkings, and you might walk down that room, and it would be an education, for you would see the pullets and cockerels in distinct classes. Let us try then to encourage the classes of dressed poultry. What we do want to look out for in considering the commercial demand, preparation for market and the points I have brought up, is the condition of the birds, the absence of offal; that is to say, the relationship of the flesh to the amount of waste material, bone, crop, and so on.

Now, it is quite impossible in a few minutes to convey everything to you. I am an enthusiast on these lines, but I hope you may one and all consider even some small attempt to educate the youth of your own districts. It may have satisfied you to see something quite the opposite of everything I have said. Encourage at your next fall fair the youth to come forward and study the educational exhibit, even on some small point. Try to improve it, whether it is the spacing, the labelling, the information, or the classification. There is an improvement, but after all, "It is a long way to Tipperary." But it will come, and Canada will stand in the forefront.

The delegates after the conclusion of Miss Yates' address interviewed the Ministers at the Parliament Buildings.

WEEDS OF ONTARIO AS THEY AFFECT FIELD CROPS.

Prof. J. E. Howitt, Guelph.

The subject which has been assigned to me is a rather difficult one to handle. It is one which a man can generalize upon, but upon which it is very hard to give facts and figures. I intend to try and handle it this afternoon in this way, under two headings; first, how the weeds affect the farm crops themselves; second, to what extent do weeds affect the pocket books of Ontario farmers. Those are the two headings under which I am going to very briefly discuss this problem.

Now, as to how weeds affect our standing crops. In the first place, weeds rob our crop plants of soil moisture. Did any of you ever think that the average mustard plant that grows in a field takes from that soil 7/10 of a pint of water every 24 hours, and any moisture which goes to that weed is lost to the crop plant. That is one thought. The second point, which is very closely allied to the first, is that weeds rob the crop plants of their food. We know that our crop plants require phosphoric acid, potash and the nitrates. Weeds live exactly on the same nourishment and take the same nourishment from the soil, and they enter into competition with our crop plants for this nourishment. More than that, a great many of our weeds ripen up their seeds before our grain plants do. What is the result of that? It is this, when a plant is ripening and maturing its seed, then it is drawing most heavily on the soil for the nutrient materials, the phosphoric acid, the potash and the nitrates. If the weed matures first, it draws on the nutrients in the soil before the grain plants start to draw on them. The consequence is that when the grain plant requires this at the time of ripening they are not present in the soil. It is very much like two men having a joint bank account. Both depend on that bank account, and one man goes to the bank and draws out all the money before the other one gets there. In the second place, weeds on our farm amongst our crops are a constant source of expense. They increase the cost of every operation on the farm, in the cultivation of the land, in the seeding, in the harvest, and in the marketing of our crops. I have not time to go into this, but thousands of dollars are spent annually throughout the Province of Ontario in the destruction of weeds, and thousands of dollars are lost annually owing to the fact that weeds are occupying land on which crop plants should be growing. Then, too, we find that weeds crowd out useful plants. They are very often more vigorous in growth, and grow up above our crop plants. Every plant in order that it may grow properly requires sunlight and air. If the weed gets up above it it prevents the crop plant from getting the proper amount of sunlight and air, and hence the plants are stunted and poor.

Field Crop Judges in the Plots at the Ontario Agricultural College.

Then, too, there is another phase of the situation that a great many of us do not realize. There are a great many dollars lost every year due to the fact that some of our weeds are poisonous. Very often we at the college have reports of stock dying due to poisonous weeds. We have one or two weeds in particular which are quite common throughout Ontario. The one which I am speaking of, the "Field Horse-tail" quite frequently gets into hay cut down in quantities, and we have cases of horses being poisoned by it. We quite frequently have cases of cattle being poisoned in spring by feeding on "Water Hemlock." If we could add those together we would find a loss of many dollars to the farmers of Ontario. I need hardly say that weed seeds reduce the market value of our seed grain and clover seed. I will touch on this point a little later when I come to discuss the effect on the pocket books of the farmers of Ontario. There is another point, and one which is often overlooked. We find that weeds harbor and encourage the development of many fungus diseases which attack our grain crops. I refer particularly to the rusts. We know there are some of our rusts which we have learned from scientific investigations are carried over from year to year by grass and weeds, and go back again to crop plants, and some of our shrubs must be included as weeds. We have such shrubs as the barberry which helps to multiply many times over the rusts which attack our grain, and their presence near grain fields does undoubtedly increase the spread of rust, and does undoubtedly affect and reduce the yield.

I have just discussed these general effects upon the crop. Now I am going to discuss very briefly the effect of weeds upon the pocket books of the farmers of Ontario. The figures that I shall give you are, of course, but approximate. At a conservative estimate, weeds cost the farmers of Ontario thirteen million dollars a year. Some of you will say that is a big figure. Let us consider it for a moment. We have approximately thirteen million acres under cultivation, and I think it is a conservative estimate to say that weeds on an average take one dollar from the productiveness of each acre, and figuring it out in that way, you see that the estimate is a conservative one. It is very much lower than that for the United States. In the United States the experts of the Department of Agriculture claim that every year weeds cause a loss throughout the United States of some two hundred million dollars. Some of you will say, "How can you arrive at these figures?" For instance, in some localities you will hear a man say, "Well, I do not believe that mustard reduces the yield of my crop. My land is strong and rich and I get just as good crops as ever." There have been very few experiments along this line until quite lately, but recently we have been conducting some experiments at the College to find out to what extent weeds are injuring the crops by actually reducing the yield. The result with mustard as far as our experiments go show that in a field of barley, where mustard was destroyed by spraying, taking equal sized plots in the field and equal parts as to soil and cultivation and moisture for comparison, that part of the field where the mustard plants were destroyed yielded nine bushels to the acre more barley than did that part on which they were allowed to remain. That is one illustration.

I can give you another. Some time ago we were working with ragweed to see what the ragweed actually did in the way of reducing the crop. It was a bad field as far as ragweed was concerned. The man had it seeded in oats and the soil was fair; it was not a good field, but we thought we could experiment with it. We took three plots in this field of equal size, and in one plot we succeeded entirely in destroying the ragweed, in another plot we destroyed about two-thirds of the ragweed, and in the third plot for comparison we left all the ragweed. That ragweed was very thick, about as thick as it could be, and at one time it looked as if it was all ragweed and not oats. We harvested the crop from these different plots, and kept account of the number of bushels that we received from each, and found that on the plots where the ragweed was not destroyed we only got four bushels to the acre; on the plots where we destroyed about two-thirds of the ragweed we got fifteen bushels to the acre; and on the plot where we entirely destroyed the ragweed, we got twenty bushels to the acre.

These are a few facts and figures to point out to you that weeds cost the farmers of Ontario and the agricultural industry of Ontario far more than the average man supposes. One way to increase production is to reduce the weeds and raise more bushels to the acre.

Moved by J. W. SHEPPARD, seconded by JAMES A. FRASER, "That this Association recommend each agricultural society in the Province of Ontario through its Board of Directors to approach the Members of the Legislature representing their riding and impress upon him the serious results that will ensue to agricultural effort in this the banner province of Canada by a reduction of the annual grant, and insist upon them using their best endeavours to sustain the original grant of $75,000 to agricultural societies voted by the House." The motion was carried.

SHORT CUTS FOR FAIR SECRETARIES.

A. E. COLGAN, DUNDALK.

In order that you may better follow my brief remarks I would ask you to refer to the entry sheets of the Proton Society distributed through the hall. This sheet makes it unnecessary to keep an entry record book, and the labor of preparing a book for this purpose is done away with, and you all know how much work this requires. It also does away with the recording of the entries in a book when receiving them for the fair. I will explain as well as possible the way in which I use this sheet. The exhibitor fills up the entry sheet the same as if an entry book were used, and after signing, sends or hands it in. When I receive it I put the member's number in the blank for the purpose at the bottom and fill up the customary entry tag or ticket. We use an ordinary shipping tag with blanks for class section and entry number. In the blank for the entry number I use the member's number; thus each exhibitor has the same entry number on all of his tags. As the tags for each sheet are made out I file the sheets until after the fair is over. In case an exhibitor desires to make additional entries I use a second sheet to save the time that would be required to look them up on the file. After the fair I arrange the sheets in alphabetical order and copy the entries from any additional sheets to the original. Then with assistant I arrange the judge's award books in order, as shown by the divisions on this sheet, and take the entry sheets calling out all the entries made, and the assistant looks up the award books. If a prize has been won I mark 1st, 2nd, or 3rd as the case may be, opposite the proper entry in the column headed "won." In the "amount" column I put the amount of the prize. In the third column I put the number of entries made in each division and the amount awarded in each division. This completes the prize winners' accounts. I then copy these to sheets which I have had specially ruled for the purpose, and which contain columns for number of entries and amount of winnings under the different headings as required in the annual report to the Department. These sheets also answer as orders on the treasurer. I have these with me, and any of you who are interested can see them at the close of this meeting, as it would take considerable time to explain them fully.

Draft Team.

This is a copy of a page of the judge's award books which I use and which will accommodate four classes with ten or less sections each, two classes with twenty or one class of forty sections. The page opposite this is left blank, and part of a page from the prize list is pasted, and after the word "class" put the figure to correspond with the class number in the prize list. If the section numbers go above ten add the necessary figures and you have your judge's books prepared with very little labour. I have with me the books used last fall at Dundalk and you can also have a look at them after the close of the meeting.

SECRETARY'S BOOKS USED FOR PROTON AGRICULTURAL SOCIETY.

Entry form and Prize Account.

To be filled in by the Exhibitor.			To be used by the Secretary.		
Class.	Section.	Article.	Won.	Amount.	No. of entries and amount in each Class.
....	....	....	.....	....	......Horses ....
....	....	....	.....	....	......Cattle............
....	....	....	.....	....	......Sheep ....
....	....	....	.....	....	......Swine............
....	....	....	.....	....	......Poultry ....
....	....	....	.....	....	......Grain ....
....	....	....	.....	....	......Roots ....
....	....	....	.....	....	......Fruit ....
....	....	....	.....	....	......Dairy ....
....	....	....	.....	....	......Fine Arts ....
....	....	....	.....	....	......Ladies' Work.....
....	....	....	.....	....	......Children's Work ..
....	....	....	.....	....	
....	....	....	.....	....	
....	....	....	.....	....	
....	....	....	.....	....	
....	....	....	.....	....	
....	....	....	.....	....	Total Won..............
....	....	....	.....	....	
....	....	....	.....	....	Amount deducted ....
....	....	....	.....	....	Amount paid............
....	....	....	.....	....	

I hereby certify that the above entries are made in accordance with the rules in the Prize List.

Name ....

Address ....

Member's No........

At Provincial Match, Ontario Plowmen's Association.

ENTRY BOOK.

Horses.	Cattle.	Sheep.	Swine.	Poultry.	Dairy.	Grain and Seeds.	Fruit and Flowers.	Roots and Vegetables.	Manufactures.	Fine Arts.	Ladies' Work.	Boys and Girls' Exhibits.	Other Educational Agricultural Exhibits.	Number 41 (Name) John Jones.
														Article.

EXHIBITOR'S ACCOUNT IN LEDGER.

AGRICULTURAL SOCIETY.

Dr. Cr. John Jones, London, Ont. 191

Date.	—	Check No.	Amount.	Article.	Prize No.	Horses.	Cattle.	Sheep.	Swine.	Poultry.	Dairy Products.	Grain and Seeds.	Roots and Vegetables.	Fruit and Flowers.	Manufactures.	Fine Arts.	Ladies' Work.	Total.
			$ c.			$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Oct. 7	To membership.		1 00	By Single Carriage Horse..	1	4 00												4 00
"	Cheque	41	20 00	" Brood Sow (Berkshire).	1				3 00									3 00
				" Boar over 1 yr. "	1				3 00									3 00
				" " under 1 yr. "	3				1 00									1 00
				" Crayon Drawing	1											1 00		1 00
				" 3 best quilts..........	1												9 00	9 00
	Total	....	21 00			4 00			7 00							1 00	9 00	21 00

AGRICULTURAL SOCIETY CASH BOOK.

RECEIPTS.

191

DR.

Date.	Name and Address.	Legislative Grant.	Municipal Grant.	Donations.	Membership Fees.	Membership Fees in advance.	Admission Fees.	Rents.	Sale of Stock.	Sale of Seeds.	Concert Receipts.	Loans.	Miscellaneous.	Total.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.

AGRICULTURAL SOCIETY CASH BOOK.

EXPENDITURE.

191

CR.

Date.	Name and Address.	Ck. No.	Horses.	Cattle.	Sheep.	Swine.	Poultry.	Dairy Products.	Grain and Seed.	Roots and Vegetables.	Fruit and Flowers.	Manufactures.	Fine Arts.	Ladies' Works	Working Expenses.	Special Attractions.	Repairs and Labor.	Interest.	Principal.	Total.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
																				104 00
Less membership fee retained....																				9 00
																				$95 00

ORDER ON TREASURER FOR PRIZE MONEY.

No. 41

Pay ....

Address ....

Date ....

Amount ....

	$ c.
Horses	4 00
Cattle	....
Sheep	....
Swine	7 00
Poultry	....
Dairy Produce	....
Grain and Seeds	....
Roots and Vegetables..	....
Fruit and Flowers.....	....
Manufactures	....
Fine Arts	1 00
Ladies' Work	9 00
....	....
....	....
Total	21 00
Less Membership..	1 00
Balance	20 00

No. 41.

191....

To the Treasurer of .... Agricultural Society.

Pay John Jones .... or order.

the sum of Twenty .... Dollars.

.... Secretary.

.... President.

SCORE CARD FOR JUDGING EGGS AT FAIRS AND EXHIBITIONS.

Disqualifications:
Unmistakable signs of faking.
An egg unfit for eating purposes.
If any egg is disqualified the whole entry shall be discarded.

Valuation size:
Should be large and uniform 20

Shape:
Should be uniform 5

Color:
Must be uniformly pure white or brown 15

Shell:
Must be unwashed, but clean; smooth, strong, free from cracks. Its texture should be uniform 10

Interior quality (by candling):
The air space should be small, and the inner shell membrane near the air space should be firm. The contents should be translucent, with the yolk showing but slightly 50
An entry shall consist of one dozen eggs.

DESIRABLE AND UNDESIRABLE TYPES OF DRAFTERS' LEGS AND FEET.

W. H. Palmer, Ohio.

A horse may be of good conformation so far as its body is concerned, and yet its usefulness will be greatly impaired if its legs and feet are not properly set on. Judges do not always bear this in mind, and consequently their decisions are unsatisfactory both to exhibitors and also from an educational point of view. The accompanying illustrations show both front and side views of correct and incorrect types of front and hind legs. In the first will be noticed the proper set of a horse's legs as seen from the front, and next to it the very common fault of front feet which toe out or toe wide. The third is wide at the knees, or a little bandy-legged and in the fourth the legs are set too close together and the toes turn in.

Illustration No. 2 shows the correct leg from a side view, then one which is set too far back under the animal, another which is knee-sprung, and still another which is what is commonly known as calf-kneed.

Any horses having front legs which do not set as indicated from the front and side views of the proper set, are not as efficient as horses having the proper set of front legs. Something must give out under the strain, and these weaknesses grow worse or cause more strain on other parts, which finally culminates in a pronounced blemish.

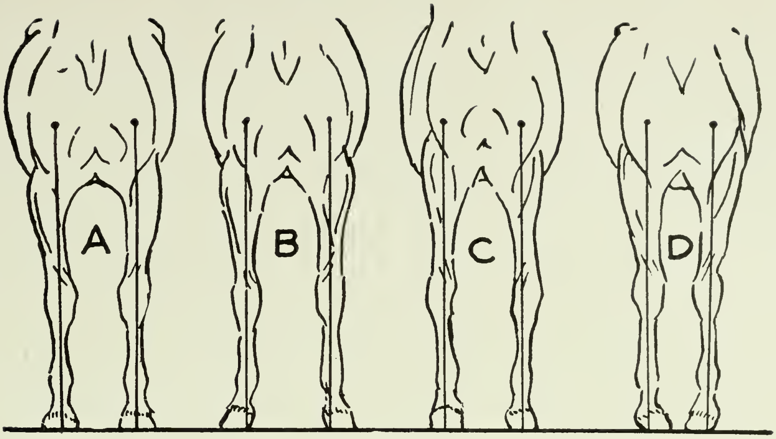


Figure 1.

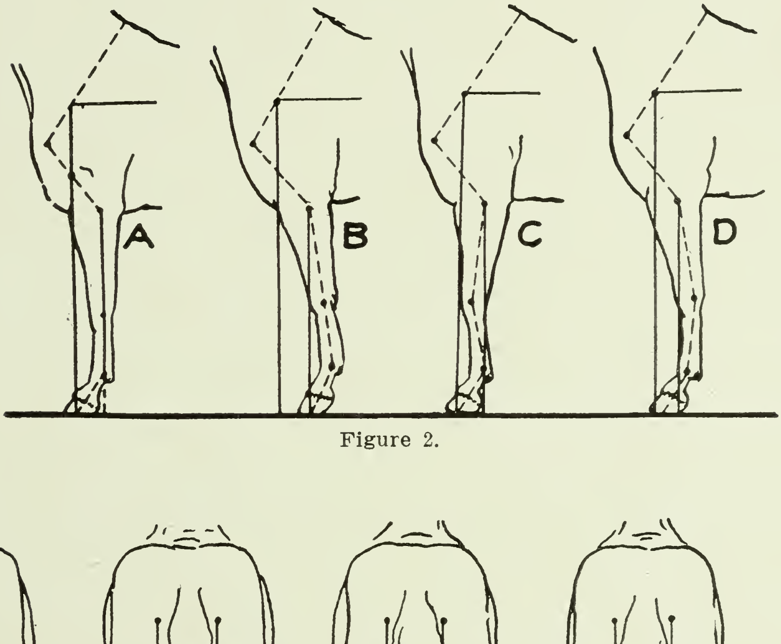


Figure 2.

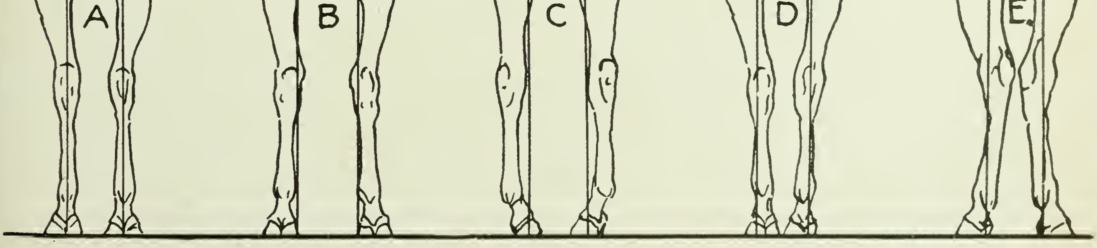


Figure 3.

Illustration No. 3, shows correct and incorrect set of hind legs, A, being a proper set. Followers of draft horses at the shows know how common it is to see a horse travel wide at the hocks. The legs shown in B of this illustration are a very good example of legs set too wide, while C shows a very bad form, the hocks wide and the fetlocks and toes pointing in. The legs shown in D are equally bad, as they are set too close together, and those shown in E, close together at the hocks, are commonly known as cow-hocks, making the animal stand very wide at the toes.

Illustration No. 4 shows the hind legs from the side view, A being the proper set, while B shows a bad case of sickle hock; C a leg which is altogether too straight, and D also another form of leg which is too straight. A little study of these four illustrations will give an intelligent idea of what is required in the proper set of a horse's legs.

In order to classify as a draft horse, an animal in fair flesh must weigh at least 1,600 pounds. The nearer the horse approaches a ton or over the better.

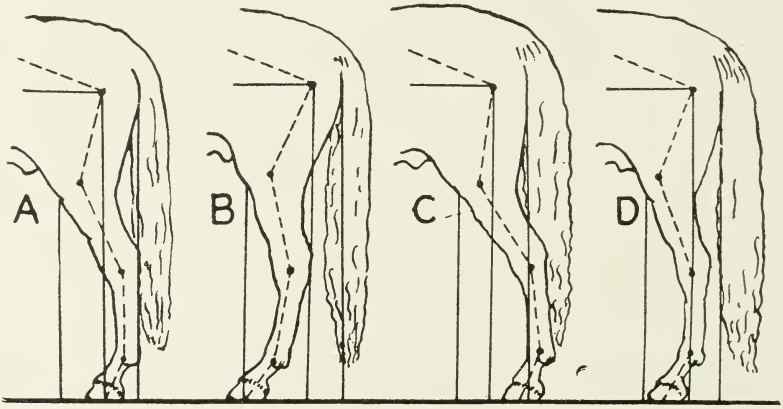


Figure 4.

This weight should be due to massiveness of form and heavy frame and muscle, rather than to a great quantity of fat. There are three classes of draft horses: light drafters, 1,600 pounds to 1,700 pounds; medium drafters, 1,700 pounds to 1,850 pounds, and heavy drafters, 1,850 pounds and over. Weight in the draft horse is of great importance. It is of value because it helps to establish the value of the drafter on the market. The heavy drafters have for many years brought the most money. Also, weight is of value, for it holds the horse's feet firmly to the ground, enabling it to exert its physical force. The railroads have taken advantage of this in building the locomotive. In the early stages of the development of the locomotive, before it was introduced as a means of transportation, the inventor had a great deal of trouble in getting the engine started, for the wheels would not adhere to the rails. It was thought that there should be cogs on the wheels and rails. By accident, it is said, they found the solution. In attempting one day to move some material in sacks down the track, part of the sacks were placed across the engine. This added weight caused the wheels to grip the rails, and the difficulty was solved. The man who rides a horse up a difficult hill applies the same principle.

The process of walking is a constant falling forwards, and the heavier the weight that falls against the collar the greater the pull.

It has been clearly demonstrated that if a horse is required to exert for a considerable length of time a pull of more than one-tenth to one-eighth of his weight, it is wearing upon its constitutional vigor and therefore affects its usefulness. At the minimum requirement, a team of 1,800 pound horses would develop 3 horse-power, but a team of 1,400 pound horses would only develop about 2 horse-power.

The form of draft horses must be such as to insure weight. The weight should be obtained by breadth and depth of body, and a heavy development of muscles on the arms and forearms, over the back and through the thighs. This heavy development of muscles helps to give the appearance of massiveness. The draft horse must give the impression of strength, of a horse of great power. In order to be efficient, drafters must carry their weight close to the ground, or, in other words, drafters must be low set. Too short a leg is as objectionable as too long a leg as it affects the efficiency of the horse.

Lack of depth of body, ranginess, openness, too great a length of leg, and lightness of muscling throughout the body are things to be criticized severely. These deficiencies detract from the weight and strength, and, therefore, affect the efficiency of the horse.

Quality in horses is an indication of wearing ability. Not being correlated with substance it is difficult of attainment in draft horses, but the tendency is toward as much quality as possible with substance. Quality is indicated by the general refined appearance of an animal, clean-cut features of the head, thin, even lips, fine ears, neatness and refinement of neck and withers, soft, silky hair, thin skin, and a clean, dense bone with a freeness from puffiness around the joints. Upon the uniform quality of all parts of the horse depend his value and the length of time he will be of service.

The draft horse must be energetic, showing sufficient nervous development to make him a willing worker. A sluggish disposition is to be avoided. There must be sufficient 'snap' about a horse for him to pick his feet up with a will, and to move off as if he meant business. Sluggishness is indicated by a lack of poise, by a slouchiness about the ears, and in the manner of standing. A good disposition is important, as it affects the ease of handling and working of a horse. It is desired that a horse perform his work willingly, and that he attends to his own business.

FITTING BEEF BREEDS FOR EXHIBITION.

While feeding is a most important feature in preparing animals of the beef breeds for exhibition, the final fitting and grooming just before the animals enter the ring play a most important part in deciding where the prizes are to go. Perfection, as far as can be obtained through grooming, is the result of many weeks of careful preparation and work.

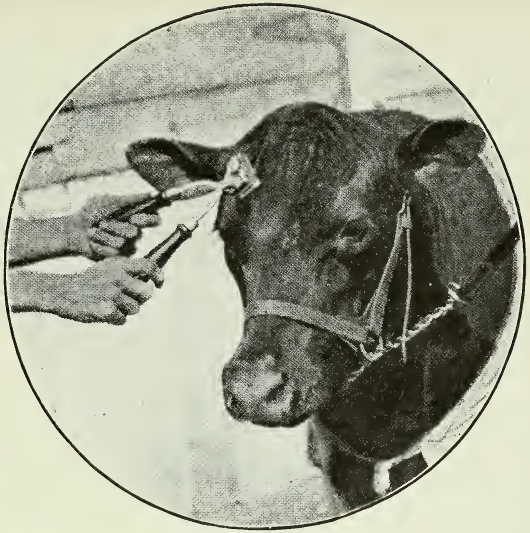
The first step in preparing an animal for exhibition is to train it as early as possible to be led with a halter. Failure to do this in good time results in a restless animal that will not stand so as to show itself to the best advantage. There is considerable tact required in order to get some cattle to pose properly, while others seem to do so almost naturally. In most cases they appear to the best advantage when they stand with feet squarely under the body and the head carried well up, but, with certain individuals, this does not hold good, and consequently each animal must be studied separately and taught to stand in the position which shows it off best.

Too much attention cannot be paid to the hair and skin. The use of the brush and currycomb is important, but much dry brushing is not as effective as washing every one or two weeks. The water used should be slightly tepid, as otherwise there is danger of the animal catching cold, and the washing is best done in the open air on a reasonably warm day. Use a soft brush after washing. Blanketing for some weeks is also essential.

The roughing up of the hair of Shorthorns and Herefords before they are shown is done as follows: First wet the animal all over, and brush the hair down smooth. Draw a straight line down the middle of the back with a comb, take a currycomb with pliable back, and placing it face down, start at the neck and draw it backwards, keeping in as nearly a straight line as possible to the hind quarters. Each time this is done keep the first row of teeth of the currycomb in the last mark of the previous row, which ensures the lines being an equal distance apart. Follow this out on both sides as far down as the flank. When this is done, start at the hind end of the animal and draw lines from bottom to top at right angles to the others, and then use a stiff brush to rub the hair up lightly without effacing the lines drawn by the currycomb. Time must be allowed for the hair to dry before the animal is shown, as judges are not inclined to look favourably on one with a wet coat of hair. A rough coat makes an animal appear thicker and more blocky and oftentimes covers up slight defects. Just before taking the animal into the ring a very little vaseline on a soft cloth rubbed on the hair gives it a fine gloss.

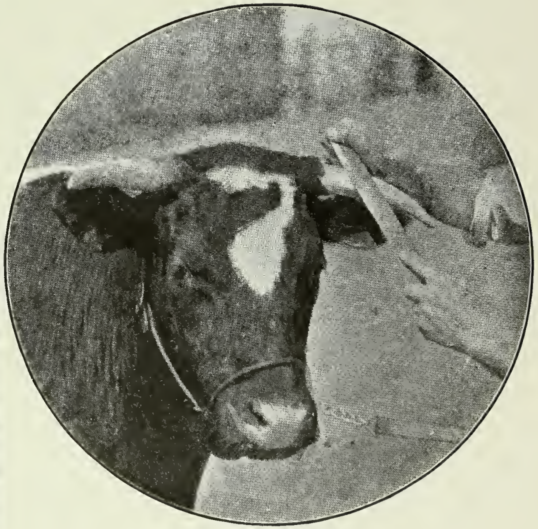
The careful herdsman sees to it that the feet of his charges are kept properly trimmed. The hoofs of animals kept indoors for exhibitions are apt to grow too long and out of shape on account of their being confined so much, and apart from appearances, overgrown hoofs cause an animal to stand badly. The front feet are not hard to trim with a blacksmith's knife unless the animal is very fractious. If the animal is very heavy, a box of the right height to permit the animal to kneel on, can be slipped under and with a broad sharp chisel the operator can quickly remove the surplus hoof, but care must be taken not to cut too deeply, and also to keep the sole pared to the right level. The box and chisel can also be used for the hind feet, in conjunction with a rope and pulley held by assistants. For nervous and somewhat vicious bulls it is sometimes necessary to throw the animal before the trimming can be safely accomplished. In polishing the horns, the rough outside scale is first removed with a sharp knife, followed by a wood rasp and glass and emery or sandpaper to make the horn perfectly smooth. Then sweet oil is applied on a piece of flannel, after which a little emery powder is sprinkled on dry flannel and rubbed in: a further polish is secured by using chamois.

The heads and the ears, inside and out, of Aberdeen Angus and animals of other polled breeds are trimmed with clippers and also the legs up to the knees and hocks. The hair of Galloways curls naturally, and only washing is necessary to secure a fine, soft coat.

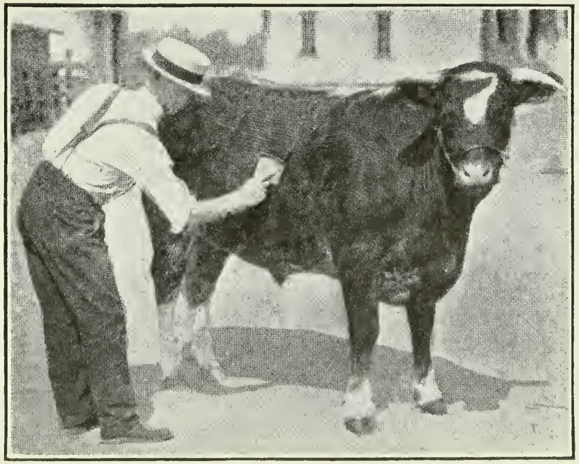


Trimming the poll.

Polishing the horn.



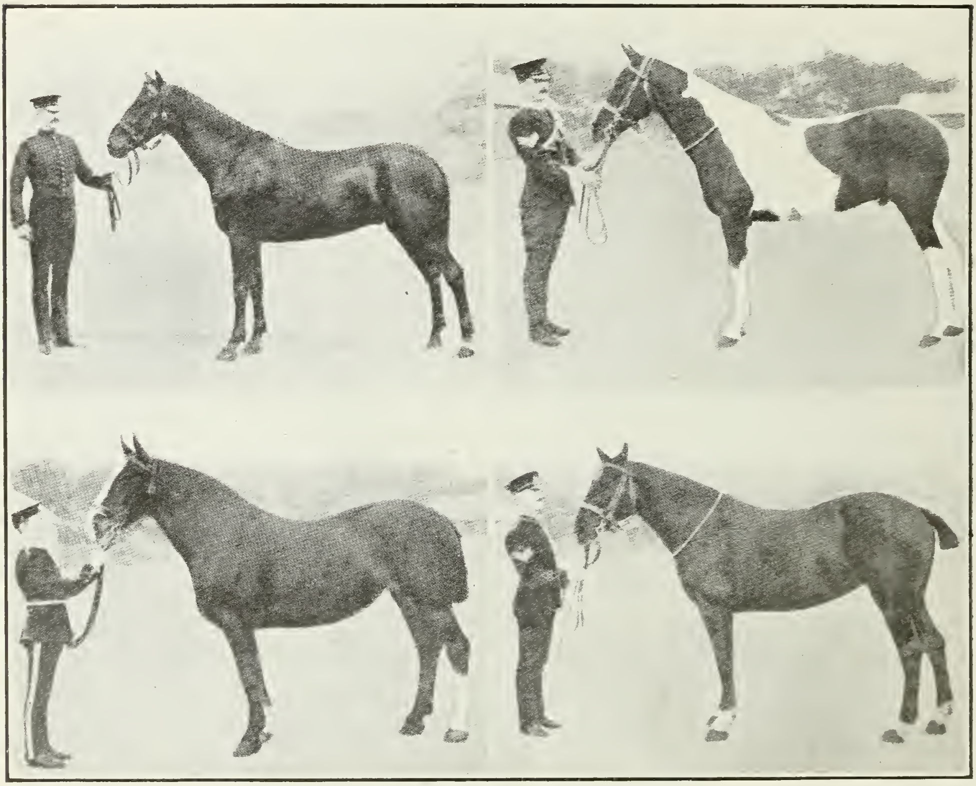
Smoothing down the horn.



Improving appearance by use of curry comb.

TYPES OF ARMY HORSES.

The accompanying illustrations show types of horses suitable for the Household Cavalry, Army Service Corps, Mounted Infantry and Royal Field Artillery. Prices paid for animals for Household Cavalry are higher than for the ordinary troop horse, because they must be well bred, good looking, able to carry a heavy rider and have a certain amount of action. Color required is black, and their height at four years of age must be fifteen hands and three inches, and at five years of age sixteen hands. The black gelding illustrated is from the Royal Horse Guards; it has plenty of strength and quality, moves well and is fast.



Types of Army Horses.

1. Household Cavalry.
2. Mounted Infantry.
3. Army Service Corps.
4. Royal Field Artillery Leader.

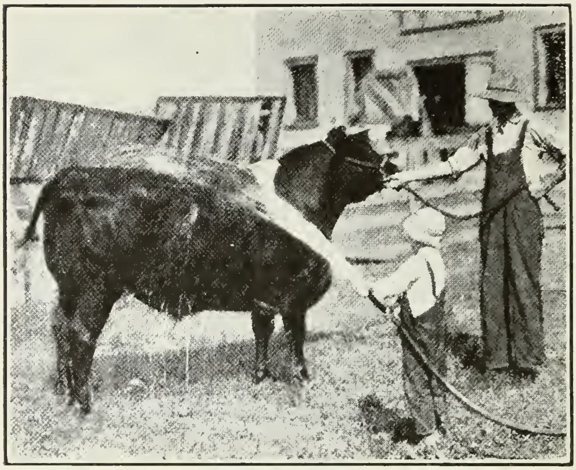
The Army Service Corps horse is of a different type, being required for draught purposes; the animal shown being a short-legged bay mare fifteen hands two inches high and eight years old. The Mounted Infantry cob is fourteen hands one and one-half inches high, and nine years old and has done a good deal of work. The Royal Field Artillery horse, a bay gelding fifteen hands, one and one-half inches high is thirteen years old, and one of the leaders of a team. It can gallop, is deep through the heart, and has short legs and the best of shoulders.

The Convention then adjourned after singing the National Anthem.

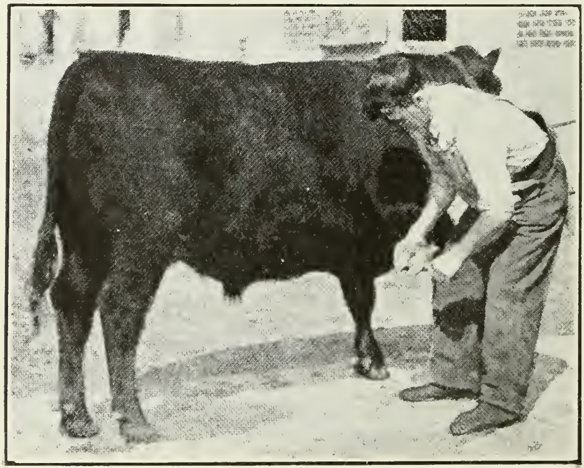
IN MEMORIAM

Only a short time after the Annual Convention was held in February, the members of the Ontario Association of Fairs and Exhibitions received, with the deepest regret, the sad news of the death of Dr. W. A. Crow, who for two years had occupied the high position of President of the Association, and had only recently handed over the reins of office to his successor. Kind and genial in manner and a good presiding officer, he was very highly esteemed by all with whom he came in contact and he will be greatly missed by a large circle of friends. During his term of office he did splendid work on behalf of the Association in which he took such a keen interest.

The Late Dr. W. A. Crow



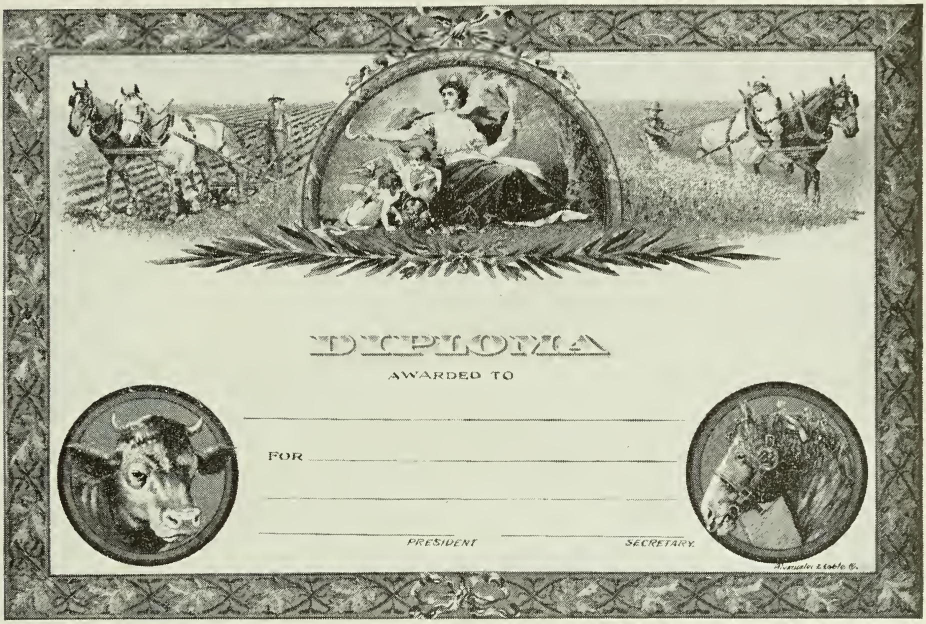
Washing off.



255

Trimming the foot.

DIPLOMA FOR FALL FAIRS.



DIPLOMA

AWARDED TO

FOR

PRESIDENT SECRETARY.

Full size, 18 x 24 inches

The above attractive design of a diploma has been produced by a Canadian firm to meet the demand for suitable awards for Fall Fairs. The original, 18 by 24 inches, is lithographed in harmonious colors on heavy plate paper. The central design represents "Ceres," the Greek Goddess, to whom was attributed by the Ancients the power over all products of the soil. On the left is a plowing scene, while a reaper is busy on the right. The live stock interests are represented in the circles below, while the border of maple leaves gives the Canadian touch. Spaces are left for putting in the name of the society and other necessary wording.

COMPARATIVE STATEMENT OF GRANTS TO AGRICULTURAL SOCIETIES, 1914-15.

	1914.	1915.
ALGOMA:		
Bruce Mines	$136 00	$137 00
Central Algoma	694 00	......
Iron Bridge	52 00	50 00
Johnston & Aberdeen	91 00	98 00
North Shore	102 00	99 00
St. Joseph Island	155 00	174 00
Thessalon	187 00	201 00
BRANT:		
Onondaga	127 00	127 00
Paris	379 00	384 00
South Brant	452 00	443 00
BRUCE:		
Arran and Tara	317 00	316 00
Carrick	202 00	211 00
Chesley	216 00	191 00
Eastnor	113 00	108 00
Hepworth	144 00	168 00
Huron Township	210 00	210 00
Kincardine	119 00	124 00
Lucknow	194 00	196 00
N. Bruce & Saugeen	176 00	166 00
Northern	199 00	172 00
Paisley	228 00	214 00
Pinkerton	102 00	100 00
Teeswater	228 00	224 00
Tiverton	129 00	119 00
Underwood	157 00	143 00
Wiarton	171 00	170 00
CARLETON:		
Carleton County	417 00	454 00
Carp	286 00	258 00
Fitzroy	162 00	173 00
Metcalfe	314 00	333 00
DUFFERIN:		
Dufferin	248 00	252 00
Dufferin Central	314 00	309 00
East Luther	221 00	226 00
DUNDAS:		
Dundas	92 00	74 00
Mountain	204 00	205 00
Winchester	318 00	208 00
DURHAM:		
Cartwright	143 00	138 00
Clarke Tp.	223 00	256 00
Millbrook	319 00	387 00
Port Hope	251 00	298 00
West Durham	402 00	398 00
ELGIN:		
Aldboro	250 00	233 00
Shedden	65 00	69 00
South Dorchester	158 00	162 00
Straffordville	94 00	91 00
West Elgin	357 00	356 00

	1914.	1915.
ESSEX:		
Amherstburg, Anderdon and Malden	146 00	165 00
Colchester South	190 00	192 00
Comber	142 00	151 00
Essex Co.	598 00	621 00
Mersea, Leamington & South Gosfield	383 00	403 00
Windsor	444 00	535 00
FRONTENAC:		
Frontenac	124 00	133 00
Kennebec	44 00	46 00
Kingston Tp.	196 00	204 00
Parham	75 00	82 00
Storrington	84 00	90 00
Wolfe Island	75 00	78 00
GLENGARRY:		
Glengarry	179 00	152 00
Kenyon	182 00	178 00
St. Lawrence Valley	278 00	280 00
GRENVILLE:		
Kemptville	199 00	196 00
Merrickville	204 00	201 00
South Grenville	205 00	217 00
Spencerville	137 00	136 00
GREY:		
Ayton	133 00	132 00
Collingwood Tp.	161 00	165 00
Desboro	163 00	173 00
East Grey	130 00	......
Egremont	151 00	156 00
Hanover, Bentinck & Brant	150 00	157 00
Holland	129 00	139 00
Keppel	90 00	87 00
Kilsyth	204 00	203 00
Markdale	159 00	184 00
Meaford & St. Vincent	178 00	179 00
Normanby	92 00	92 00
Osprey	136 00	134 00
Owen Sound	344 00	371 00
Priceville	101 00	116 00
Proton	201 00	213 00
Rocklyn	161 00	166 00
South Grey	179 00	172 00
Sydenham	96 00	99 00
Walter's Falls	147 00	170 00
HALDIMAND:		
Caledonia	539 00	543 00
Canboro	47 00	48 00
Dunnville	173 00	167 00
Haldimand	211 00	212 00
Southern Branch	108 00	118 00
Walpole	184 00	191 00
HALIBURTON:		
Glamorgan	44 00	47 00
Haliburton	158 00	181 00
Minden	173 00	183 00

COMPARATIVE STATEMENT OF GRANTS TO AGRICULTURAL SOCIETIES, 1914-15.—*Continued.*

	1914.	1915.
HALTON:		
Acton	300 00	255 00
Esquesing	236 00	252 00
Halton	380 00	386 00
Nelson & Burlington	203 00	215 00
Trafalgar	248 00	237 00
HASTINGS:		
Bancroft	127 00	131 00
Belleville	361 00	354 00
Frankford	302 00	306 00
Madoc	211 00	217 00
Marmora	145 00	136 00
Maynooth	74 00	91 00
Shannonville	135 00	142 00
Stirling	201 00	212 00
Tweed	227 00	215 00
Wollaston	84 00	89 00
HURON:		
Bayfield	102 00	100 00
Blyth	157 00	149 00
Dungannon	140 00	136 00
East Huron	208 00	214 00
Exeter	210 00	215 00
Goderich Industrial	264 00	270 00
Howick	135 00	131 00
Seaforth	201 00	209 00
South Huron (Spring Fair Only)	......	......
Turnberry	203 00	191 00
Zurich	121 00	116 00
KENORA:		
Dryden	262 00	338 00
Kenora	372 00	390 00
KENT:		
Camden	134 00	132 00
East Kent	218 00	224 00
Harwich	203 00	204 00
Howard	302 00	290 00
Orford	236 00	237 00
Raleigh & Tilbury	167 00	157 00
Romney	128 00	131 00
Wallaceburg	122 00	124 00
West Kent	389 00	397 00
LAMBTON:		
Bosanquet	159 00	169 00
Brooke & Alvinston	258 00	257 00
East Lambton	268 00	263 00
Florence	159 00	163 00
Forest	187 00	192 00
Moore	274 00	265 00
Petrolia & Enniskillen	375 00	373 00
Plympton & Wyoming	160 00	159 00
Sombra	117 00	111 00
West Lambton	361 00	340 00
LANARK:		
Dalhousie	117 00	108 00
Lanark Tp.	132 00	133 00
Lanark Village and Bathurst	223 00	207 00
Maberly	74 00	74 00
North Lanark	623 00	631 00
Pakenham	171 00	172 00
South Lanark	353 00	309 00
LEEDS:		
Brockville	700 00	583 00
Delta	240 00	239 00
Frankville	202 00	189 00
Lansdowne	182 00	181 00
Lombardy	114 00	115 00
North Crosby	71 00	58 00
Rear of Leeds and Lansdowne	44 00	46 00
LENNOX AND ADDINGTON:		
Addington	47 00	55 00
Amherst Island	140 00	140 00
Centreville	82 00	80 00
Ernestown	89 00	93 00
Lennox	296 00	285 00
LINCOLN:		
Abingdon	70 00	69 00
Clinton	199 00	218 00
Monck	55 00	74 00
Niagara Town & Tp.	108 00	105 00
Peninsular Central	107 00	105 00
MANITOULIN ISLAND:		
Billings	277 00	254 00
Gore Bay	378 00	359 00
Howland	126 00	122 00
Manitowaning	182 00	212 00
Providence Bay	140 00	148 00
MIDDLESEX		
Caradoc	110 00	116 00
Delaware	149 00	155 00
Dorchester	215 00	224 00
East Middlesex	100 00	100 00
London Tp.	109 00	101 00
McGillivray	71 00	76 00
Melbourne	300 00	300 00
Mosa & Ekfrid	203 00	215 00
North Middlesex	121 00	118 00
Parkhill	128 00	136 00
Strathroy	480 00	464 00
Thorndale	121 00	123 00
Westminster	118 00	125 00
MUSKOKA:		
Baysville	117 00	134 00
Gravenhurst and Muskoka	304 00	337 00
Medora & Wood	238 00	280 00
Morrison	93 00	110 00
North Muskoka	348 00	349 00
South Muskoka	789 00	792 00
Stephenson & Watt	248 00	281 00
Stisted	150 00	147 00

COMPARATIVE STATEMENT OF GRANTS TO AGRICULTURAL SOCIETIES, 1914-15.—*Continued.*

NIPISSING:	1914.	1915.
Astorville	133 00	134 00
Bonfield	129 00	130 00
East Nipissing	326 00	305 00
Sturgeon Falls	203 00	224 00
Verner	236 00	263 00
NORFOLK:		
Charlotteville	155 00	150 00
Courtland	88 00	95 00
Houghton	114 00	127 00
Norfolk Co.	593 00	600 00
North Walsingham	125 00	116 00
Townsend	80 00	76 00
Windham	103 00	103 00
NORTHUMBERLAND:		
Alnwick	133 00	130 00
Brighton	182 00	187 00
Cobourg Central	332 00	288 00
Colborne	281 00	283 00
Cramahe	149 00	152 00
Percy Tp.	342 00	350 00
Seymour	185 00	180 00
Wooler	98 00	98 00
ONTARIO:		
Beaverton	167 00	170 00
Brock	256 00	250 00
Pt. Perry, Reach & Scugog	143 00	152 00
Ramona	38 00	44 00
Scott	128 00	134 00
South Ontario	463 00	484 00
Uxbridge	203 00	221 00
OXFORD:		
Drumbo	310 00	319 00
East Nissouri	72 00	76 00
Ingersoll, North and West Oxford	160 00	142 00
North Norwich	200 00	191 00
South Norwich	153 00	151 00
Tavistock	229 00	225 00
Tillsonburg and Dereham	237 00	252 00
West Zorra & Embro	151 00	147 00
Woodstock	509 00	510 00
PARRY SOUND:		
Armour, Ryerson and Burk's Falls	464 00	478 00
Christie	120 00	96 00
Loring	200 00	214 00
Machar	204 00	223 00
Magnetawan	239 00	259 00
McKellar	286 00	312 00
McMurrich	266 00	277 00
Parry Sound	312 00	328 00
Perry	291 00	288 00
Powassan	279 00	291 00
Rosseau	144 00	173 00
Strong	280 00	299 00
United Tps.	140 00	151 00

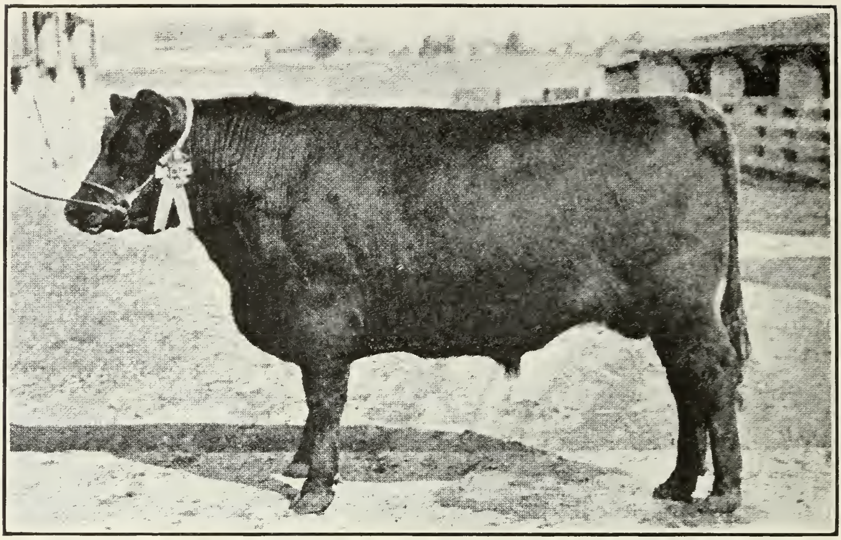
PEEL:	1914.	1915.
Albion & Bolton	296 00	283 00
Caledon	192 00	177 00
Cooksville	232 00	250 00
Peel	448 00	444 00
Toronto Gore (Spring Fair Only)	......	......
Toronto Tp.	356 00	384 00
PERTH:		
Elma	125 00	124 00
Fullarton, Logan & Hibbert	246 00	241 00
Kirkton	156 00	161 00
Listowel	171 00	142 00
Mornington	196 00	196 00
South Perth	184 00	183 00
Stratford	280 00	286 00
PETERBOROUGH:		
East Peterborough	361 00	350 00
Galway	51 00	46 00
Lakefield	130 00	129 00
Otonabee	131 00	141 00
Peterborough Indust.	628 00	655 00
PRESCOTT:		
Alfred	100 00	95 00
South Plantagenet	96 00	97 00
Vankleek Hill	366 00	362 00
PRINCE EDWARD:		
Ameliasburg	162 00	158 00
Prince Edward	482 00	517 00
Sophiasburg	116 00	116 00
RAINY RIVER:		
Atwood	......	127 00
Rainy River Valley	490 00	601 00
RENFREW:		
Arnprior	167 00	185 00
Cobden	183 00	188 00
North Renfrew	381 00	371 00
Renfrew	623 00	617 00
RUSSELL:		
Casselman	59 00	58 00
Clarence	95 00	105 00
Russell	206 00	225 00
SIMCOE:		
Alliston	137 00	176 00
Barrie	425 00	424 00
Beeton	205 00	189 00
Bradford and West Gwillimbury	211 00	207 00
Coldwater	130 00	157 00
Cookstown	258 00	227 00
East Simcoe		No Fair
Flos Tp.	187 00	181 00
Nottawasaga & G. Northern	224 00	264 00
Oro	177 00	180 00
Tiny & Tay	210 00	......

COMPARATIVE STATEMENT OF GRANTS TO AGRICULTURAL SOCIETIES, 1914-15.—*Continued.*

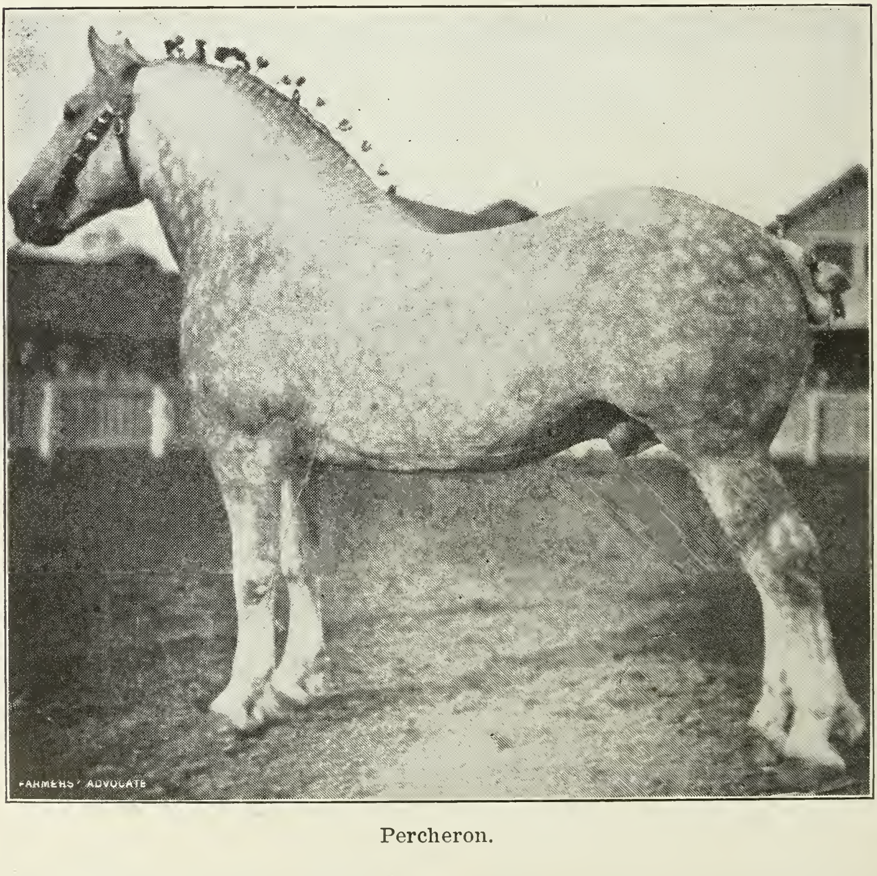
	1914.	1915.
STORMONT:		
Cornwall	262 00	275 00
Finch	75 00	79 00
Roxborough	132 00	142 00
Stormont	118 00	119 00
SUDBURY:		
Martland & Cosby	52 00	60 00
Massey	287 00	284 00
Warren	198 00	211 00
TEMISKAMING:		
Charlton	155 00	164 00
Cochrane	132 00	92 00
Englehart	180 00	189 00
Matheson	124 00	118 00
New Liskeard	435 00	439 00
THUNDER BAY:		
Oliver	323 00	363 00
West Algoma	800 00	800 00
Whitefish Valley	109 00	182 00
VICTORIA:		
Eldon	137 00	126 00
Fenelon	142 00	148 00
Mariposa	117 00	127 00
North Victoria	60 00	58 00
South Victoria	702 00	680 00
Verulam	254 00	205 00
WATERLOO:		
Elmira & Woolwich	132 00	146 00
South Waterloo	493 00	505 00
Wellesley and North Easthope	221 00	215 00
Wilmot	198 00	208 00
WELLAND:		
Bertie	210 00	225 00
Fenwick	228 00	233 00
Stamford & Niagara Falls	......	......
Thorold Town & Tp.	154 00	151 00
Wainfleet	99 00	97 00
Welland	352 00	390 00
WELLINGTON:		
Arthur	165 00	177 00
Centre Wellington	298 00	310 00
Erin	346 00	347 00
Guelph & South Wellington	736 00	......
Maryborough	72 00	71 00
Mount Forest	301 00	308 00
Palmerston	111 00	139 00
Peel & Drayton	138 00	143 00
Puslinch	164 00	161 00
Rockwood	171 00	186 00
West Garafraxa	105 00	89 00
West Wellington	153 00	154 00
WENTWORTH:		
Ancaster	160 00	160 00
Binbrook	83 00	85 00
Hamilton and Wentworth	429 00	465 00
Rockton	338 00	338 00
Waterdown	212 00	213 00
West Flamboro	159 00	148 00
YORK:		
Markham	736 00	742 00
Newmarket	458 00	450 00
Queensville	134 00	133 00
Richmond Hill	173 00	174 00
Scarboro	290 00	305 00
Schomberg	270 00	265 00
Sutton	141 00	150 00
Weston, York and Etobicoke	239 00	227 00
Woodbridge	533 00	529 00
	$73,022 00	$72,682 00

SPECIAL GRANTS TO SOCIETIES IN THE DISTRICTS.

Societies.	1914.	1915.
ALGOMA:		
Bruce Mines	$73 00	$69 00
Central Algoma	100 00	......
Iron Bridge	28 00	25 00
Johnston & Aberdeen	49 00	49 00
North Shore	54 00	49 00
St. Joseph Island	83 00	87 00
Thessalon	100 00	100 00
FRONTENAC:		
Kennebec	47 00	46 00
Parham	81 00	82 00
HALIBURTON:		
Glamorgan	24 00	23 00
Haliburton	85 00	91 00
Minden	92 00	91 00
HASTINGS:		
Bancroft	100 00	100 00
Maynooth	79 00	91 00
Wollaston	90 00	89 00
KENORA:		
Dryden	100 00	100 00
Kenora	100 00	100 00



This breed requires only slight attention as to coat to fit it for the show ring.



Percheron.

SPECIAL GRANTS TO SOCIETIES IN THE DISTRICTS.—*Continued.*

Manitoulin:		
Billings	100 00	100 00
Gore Bay	100 00	100 00
Howland	67 00	61 00
Manitowaning	97 00	100 00
Providence Bay	75 00	74 00
Muskoka:		
Baysville	62 00	67 00
Gravenhurst and Muskoka	100 00	100 00
Medora & Wood	100 00	100 00
Morrison	50 00	55 00
North Muskoka	100 00	100 00
South Muskoka	100 00	100 00
Stephenson & Watt	100 00	100 00
Stisted	80 00	73 00
Nipissing:		
Astorville	71 00	67 00
Bonfield	69 00	65 00
East Nipissing	100 00	100 00
Sturgeon Falls	100 00	100 00
Verner	100 00	100 00
Parry Sound:		
Armour, Ryerson & Burk's Falls	100 00	100 00
Christie	49 00	48 00
Loring	100 00	100 00
Machar	100 00	100 00
Magnetawan	100 00	100 00
McKellar	100 00	100 00
McMurrich	100 00	100 00
Parry Sound	100 00	100 00
Perry	100 00	100 00
Powassan	100 00	100 00
Rosseau	77 00	86 00
Strong	100 00	100 00
United Townships	74 00	76 00
Peterborough:		
Galway	......	46 00
Rainy River:		
Rainy River Valley	100 00	100 00
Sudbury:		
Massey	100 00	100 00
Martland & Cosby	......	22 00
Warren	100 00	100 00
Temiskaming:		
Charlton	83 00	82 00
Cochrane	......	49 00
Englehart	96 00	94 00
Matheson	65 00	52 00
New Liskeard	100 00	100 00
Thunder Bay:		
Oliver	100 00	100 00
West Algoma	100 00	100 00
Whitefish Valley	100 00	91 00
	$5,000 00	$5,000 00

GRANTS TO SPRING FAIRS—1915.

Stallion Shows, 1915, $842.00.

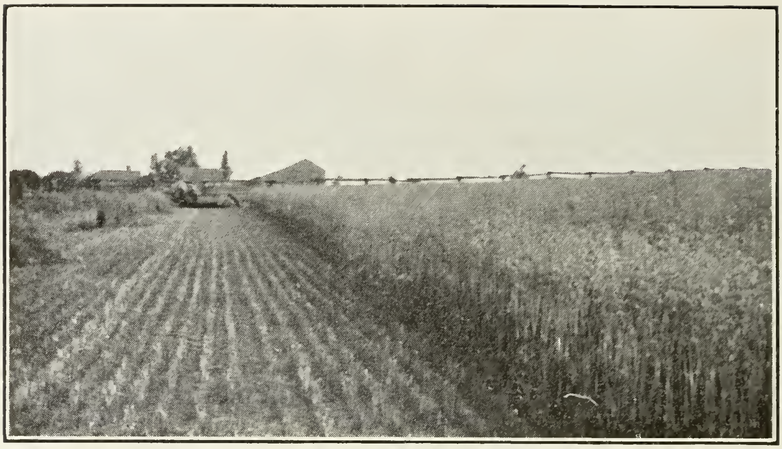
Halton (for 1914)	$50 00
Dunnville	7 00
South Perth	36 00
Wilmot	50 00
Elmira & Woolwich	50 00
Carrick	50 00
Stratford	50 00
East Luther	50 00
Forest	50 00
Barrie	50 00
West Kent	50 00
Dufferin Central	50 00
Arthur	50 00
Erin	50 00
Esquesing	50 00
Walpole	6 00
Peel Co.	50 00
Meaford & St. Vincent	33 00
Palmerston	47 00
Proton	13 00
	$842 00

Stallion and Bull Shows, 1915, $355.00.

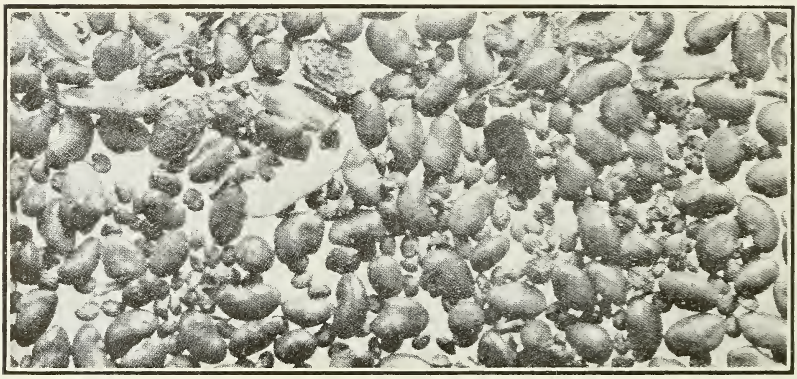
South Huron	$50 00
Fullarton, Logan & Hibbert	50 00
Weston, York & Etobicoke	50 00
Paris	50 00
Woodstock	30 00
Seaforth	50 00
Rocklyn	25 00
Toronto Gore	50 00
	$355 00

Seed Fairs, 1915, $208.00.

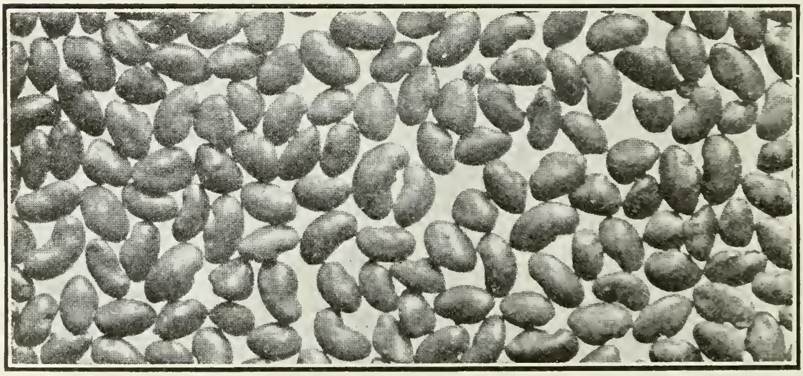
Verulam	$25 00
Richmond Hill	25 00
Renfrew	25 00
South Huron	14 00
Centre Wellington	23 00
Carrick	25 00
Stratford	16 00
Woodstock	16 00
South Waterloo	17 00
Collingwood Tp.	22 00
	$208 00



First Prize Field of O. A. C. 72 Oats, grown by B. Tolton, Guelph.



Poor and Mixed Alfalfa Seed.



Good Alfalfa Seed.

GRANTS TO SOCIETIES OWNING PURE-BRED STOCK—1915.

Colchester North	$240 00
Drummond	70 00
Dummer & Douro	290 00
East Huron	80 00
Emily	166 00
Kenora	40 00
Lakehurst	170 00
Oldcastle	380 00
Osgoode	225 00
South Woodslee	620 00
Verulam	40 00
	$2,321 00

SPECIAL GRANTS.

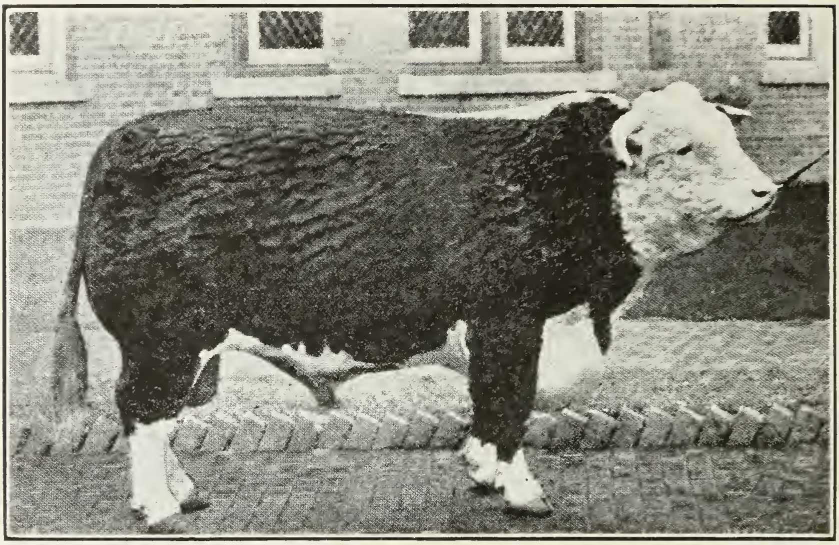
	1914.	1915.
INDIAN SOCIETIES:		
Six Nations	$100 00	$100 00
United Indian	100 00	100 00
	$200 00	$200 00

GRANTS TO THE CANADIAN NATIONAL, CENTRAL CANADA AND WESTERN FAIR.

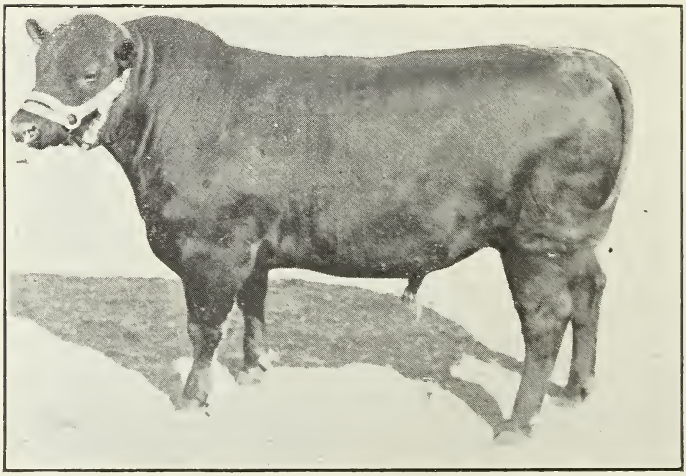
	1914.	1915.
Canadian National	$2,500 00	$2,500 00
Central Canada	1,316 00	1,250 00
Western Fair	1,184 00	1,250 00
	$5,000 00	$5,000 00

LEGISLATIVE GRANTS TO AGRICULTURAL SOCIETIES WHICH HELD FIELD CROP COMPETITIONS IN 1914.

Societies.	
ALGOMA:	
Central Algoma	$100 00
North Shore	50 00
St. Joseph Island	100 00
Thessalon	100 00
BRANT:	
Paris	50 00
Onondaga	50 00
Six Nations	50 00
South Brant	50 00
BRUCE:	
Carrick	50 00
Chesley	50 00
Eastnor	150 00
Hepworth	50 00
Huron Tp.	150 00
Lucknow	50 00
North Bruce & Saugeen	50 00
Northern	50 00
Pinkerton	50 00
Teeswater	50 00
Wiarton	100 00
CARLETON:	
Carleton Co.	50 00
Fitzroy	150 00
Metcalfe	50 00
DUFFERIN:	
Dufferin	50 00
Dufferin Central	50 00
East Luther	50 00
DUNDAS:	
Mountain	150 00
Winchester	100 00
DURHAM:	
Millbrook	50 00
Orono	100 00
Port Hope	100 00
West Durham	50 00
ELGIN:	
Aldboro	50 00
Shedden	50 00
South Dorchester	100 00
West Elgin	100 00
ESSEX:	
Amherstburg, Anderdon and Malden	150 00
Comber	50 00
Essex Co.	50 00
South Woodslee	50 00
Windsor	50 00
FRONTENAC:	
Kingston Tp.	50 00
Wolfe Island	50 00



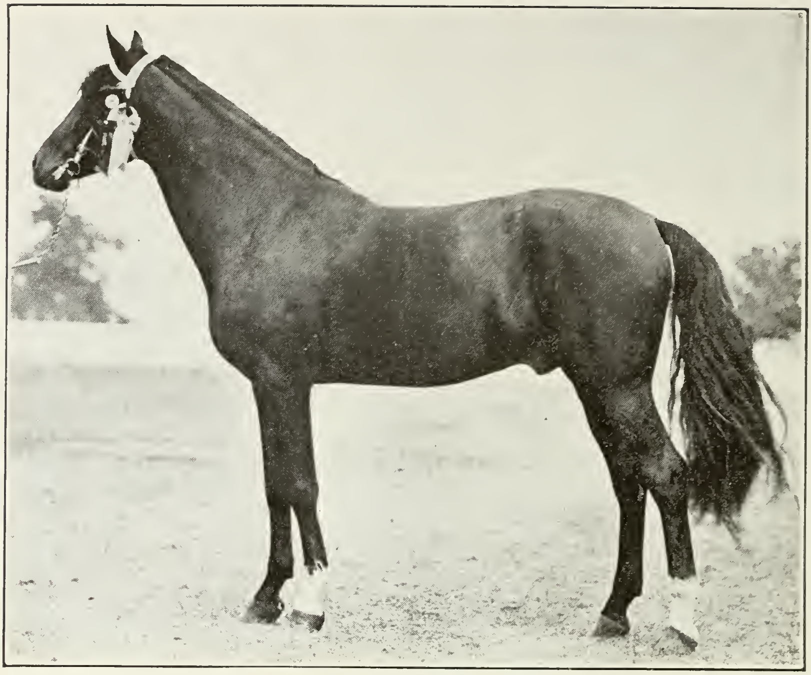
Hereford.



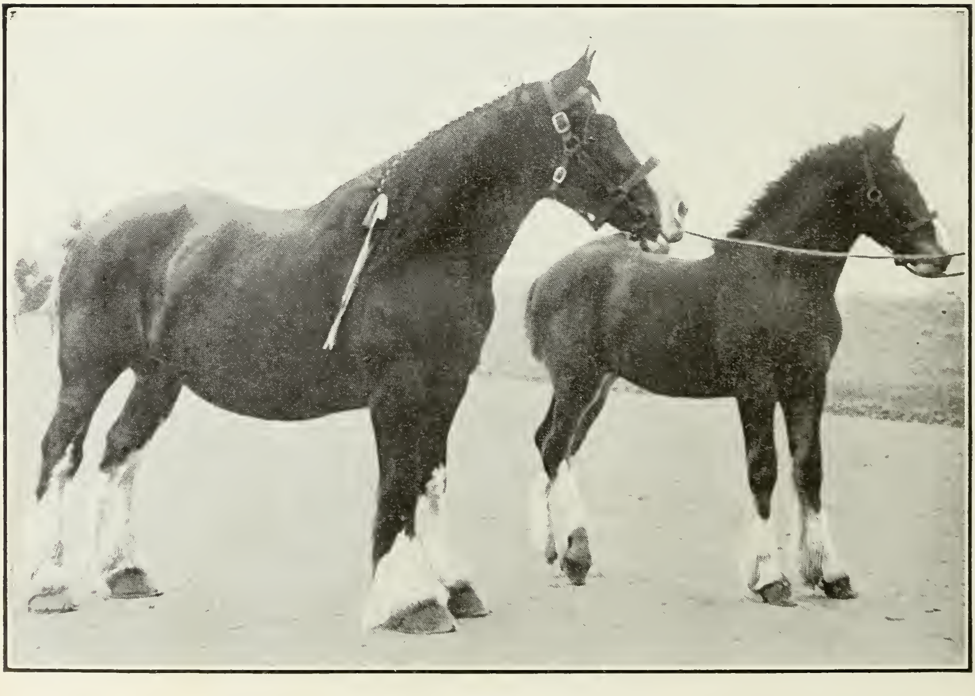
Aberdeen-Angus.

LEGISLATIVE GRANTS TO AGRICULTURAL SOCIETIES WHICH HELD FIELD CROP COMPETITIONS IN 1914.—*Continued.*

GLENGARRY:	
Kenyon	50 00
St. Lawrence Valley	50 00
GREY:	
Ayton	50 00
Collingwood Tp.	50 00
Desboro	50 00
Egremont	50 00
Keppel	100 00
Kilsyth	150 00
Markdale	50 00
Normanby	50 00
Osprey	50 00
Priceville	50 00
Proton	100 00
Rocklyn	150 00
South Grey	100 00
Walter's Falls	150 00
HALDIMAND:	
Caledonia	150 00
Haldimand	50 00
Southern Branch	50 00
HALTON:	
Halton	150 00
Nelson & Burlington	50 00
Trafalgar	50 00
HASTINGS:	
Frankford	100 00
Madoc	50 00
Maynooth	50 00
Stirling	150 00
HURON:	
Blyth	50 00
East Huron	50 00
Exeter	100 00
Howick	50 00
Seaforth	50 00
Turnberry	50 00
West Huron	50 00
KENORA:	
Dryden	150 00
KENT:	
Harwich	50 00
Orford	50 00
Raleigh & Tilbury	50 00
Wallaceburg	100 00
West Kent	50 00
LAMBTON:	
Bosanquet	100 00
Brooke & Alvinston	150 00
Florence	100 00
Plympton & Wyoming	50 00
Sombra	100 00
LANARK:	
Lanark Village & Bathurst	50 00
LEEDS:	
Lansdowne	50 00
Lombardy	50 00
LENNOX AND ADDINGTON:	
Lennox	50 00
LINCOLN:	
Clinton	50 00
MANITOULIN:	
Gore Bay	50 00
MIDDLESEX:	
Caradoc	100 00
Dorchester	50 00
East Middlesex	100 00
McGillivray	50 00
Mosa & Ekfrid	50 00
North Middlesex	50 00
Strathroy	100 00
Westminster	50 00
MUSKOKA:	
Gravenhurst & Muskoka	50 00
Medora & Wood	100 00
South Muskoka	100 00
Stephenson & Watt	100 00
NIPISSING:	
Bonfield	50 00
Verner	150 00
NORFOLK:	
Courtland	150 00
Houghton	150 00
North Walsingham	50 00
NORTHUMBERLAND:	
Seymour	50 00
Wooler	50 00
ONTARIO:	
Beaverton	50 00
OXFORD:	
East Nissouri	50 00
Ingersoll, N. & W. Oxford	50 00
North Norwich	100 00
South Norwich	50 00
Tillsonburg & Dereham	50 00
West Zorra & Embro	50 00
PARRY SOUND:	
Armour, Ryerson and Burk's Falls	100 00
Loring	50 00
Machar	100 00
Magnetawan	50 00
McKellar	50 00
McMurrich	100 00
Parry Sound	100 00
Perry	100 00
Powassan	100 00
Strong	100 00



Standard-Bred



Draft Brood Mare and Foal.

LEGISLATIVE GRANTS TO AGRICULTURAL SOCIETIES WHICH HELD FIELD CROP COMPETITIONS IN 1914.—*Continued.*

PEEL:	
Albion & Bolton	50 00
Peel	50 00
Toronto Tp.	50 00
PERTH:	
Elma	50 00
Fullarton, Logan & Hibbert	50 00
Kirkton	150 00
PETERBOROUGH:	
Otonabee	50 00
Peterborough Industrial	50 00
PRESCOTT:	
Alfred	50 00
PRINCE EDWARD:	
Ameliasburg	50 00
Prince Edward	50 00
Sophiasburg	50 00
RAINY RIVER:	
Rainy River Valley	150 00
RENFREW:	
Arnprior	50 00
Cobden	150 00
North Renfrew	150 00
Renfrew	100 00
RUSSELL:	
Russell	50 00
SIMCOE:	
Barrie	100 00
East Simcoe	50 00
Nottawasaga & G. Northern	50 00

TEMISKAMING:	
Charlton	50 00
New Liskeard	100 00
THUNDER BAY:	
Oliver	50 00
Whitefish Valley	50 00
VICTORIA:	
Eldon	50 00
Emily	50 00
Fenelon	50 00
Verulam	150 00
WATERLOO:	
South Waterloo	150 00
WELLAND:	
Bertie	100 00
Fenwick	50 00
Welland	50 00
WELLINGTON:	
Centre Wellington	150 00
Erin	150 00
Mount Forest	50 00
Puslinch	50 00
Rockwood	50 00
WENTWORTH:	
Waterdown	100 00
West Flamborough	50 00
YORK:	
Markham	50 00
Richmond Hill	50 00
Scarboro	100 00
Schomberg	50 00
Total	$12,900 00

GRANTS TO SOCIETIES WHICH SUFFERED LOSSES IN GATE RECEIPTS THROUGH WET WEATHER.

Societies.	
CARLETON:	
Metcalfe	$60 00
DURHAM:	
West Durham	218 00
ESSEX:	
Windsor & N. Essex	287 00
GREY:	
Owen Sound	47 00
Proton	153 00
LEEDS:	
Brockville	300 00
North Crosby	103 00
MIDDLESEX:	
Strathroy	98 00

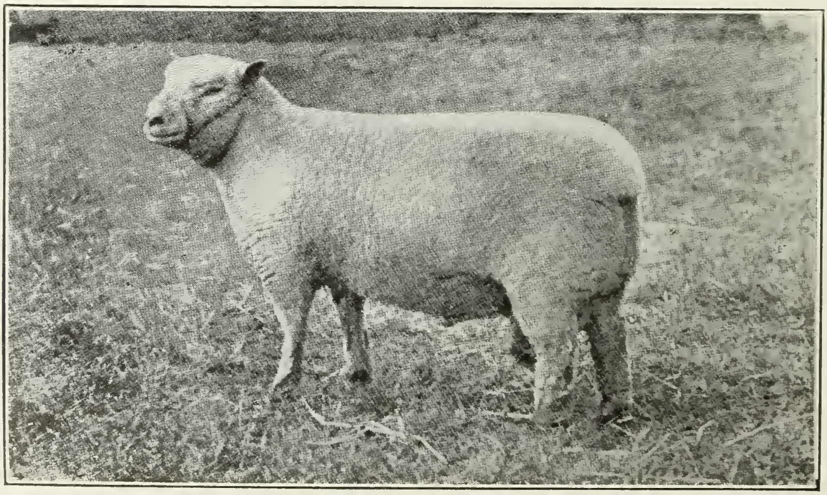
NORFOLK:	
Norfolk Co.	166 00
NORTHUMBERLAND:	
Cobourg Central	130 00
OXFORD:	
North Norwich	55 00
PEEL:	
Caledon	32 00
Peel Co.	277 00
PERTH:	
Elma	35 00
Listowel	151 00
South Perth	119 00
Stratford	48 00

GRANTS TO SOCIETIES WHICH SUFFERED LOSSES IN GATE RECEIPTS THROUGH WET WEATHER.—*Continued.*

VICTORIA:	
North Victoria	14 00
WELLAND:	
Bertie	65 00
WELLINGTON:	
Erin	270 00
WENTWORTH:	
West Flamboro	103 00
YORK:	
Schomberg	110 00
Scarboro	44 00
	$2,885 00

REPORTS OF STOCK SOCIETIES.

Societies.	RECEIPTS.					EXPENDITURE.			
	Legislative grant.	Members' fees for 1914.	Municipal grant.	Sale of stock.	Total actual receipts.	Purchase of live stock.	Keep of stock.	Officers' salaries.	Total actual expenditure.
	$	$	$	$	$	$	$	$	$
Colchester North	200	240	150	9	599	755	40	10	829
Drummond	100	60	50	21	231	204	40	10	257
Dummer and Douro	320	147	......	128	875	257	435	12	757
Emily	130	163	50	55	451	326	200	15	648
Lakehurst	150	61	......	......	220	211	......	......	211
Oldcastle	380	530	150	12	1,072	250	272	22	567
Osgoode	215	130	......	50	402	325	187	10	524
South Woodslee	580	587	150	......	1,427	1,015	255	54	1,442
	2,075	1,918	550	275	5,277	3,343	1,429	133	5,235



Southdown.

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES IN ONTARIO IN 1914,

Societies.	Horses.	Cattle,	Sheep.	Swine.	Miscellaneous.	Total.
ALGOMA:	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Bruce Mines	40 50	34 00	15 00	1 75	150 50	241 75
Central Algoma	No	fair				
Iron Bridge	13 25	12 50	8 00	2 50	54 00	90 25
Johnston & Aberdeen	39 00	17 50	26 00	1 75	80 50	164 75
North Shore	20 25	8 00	15 75	....	84 25	128 25
St. Joseph Island	48 00	35 00	20 00	1 00	100 00	204 00
Thessalon	77 00	47 00	18 00	6 00	163 85	311 85
BRANT:						
Onondaga	97 50	63 50	14 50	21 00	231 75	428 25
Paris	323 00	151 00	143 00	105 00	562 50	1,284 50
South Brant	421 00	150 50	166 00	77 00	632 50	1,447 00
BRUCE:						
Arran & Tara	501 00	158 00	86 00	36 25	266 30	1,047 55
Carrick	202 50	131 00	57 00	26 75	299 50	716 75
Chesley	220 50	67 00	26 00	12 50	249 30	575 30
Eastnor	69 00	23 00	12 50	11 00	165 75	281 25
Hepworth	169 50	83 50	35 25	5 50	222 50	516 25
Huron Tp.	159 75	87 50	50 50	26 00	333 20	656 95
Kincardine	151 00	65 00	37 25	19 75	160 00	433 00
Lucknow	185 50	105 50	39 50	17 50	300 75	648 75
N. Bruce & Saugeen	202 00	64 00	38 50	31 00	255 75	591 25
Northern	160 00	93 00	70 25	23 00	309 90	656 15
Paisley	179 50	99 00	63 75	34 00	324 50	700 75
Pinkerton	56 50	33 00	12 25	7 50	181 25	290 50
Teeswater	190 00	154 75	41 75	31 75	306 25	724 50
Tiverton	123 00	77 00	24 00	13 00	131 73	368 73
Underwood	132 50	63 25	35 25	50 50	169 75	451 25
Wiarton	116 75	102 50	47 50	28 50	206 25	501 50
CARLETON:						
Carleton Co.	443 00	326 00	206 00	230 00	483 58	1,688 58
Carp	358 00	93 00	30 00	19 00	255 80	755 80
Fitzroy	130 50	83 34	15 50	12 00	230 10	471 44
Metcalfe	309 50	214 75	64 00	63 75	319 45	971 45
DUFFERIN:						
Dufferin	235 00	130 00	63 00	12 00	419 85	859 85
Dufferin Central	307 00	177 00	62 00	29 00	394 00	969 00
East Luther	145 00	112 00	64 00	6 00	402 50	729 50
DUNDAS:						
Dundas	220 00	....	....	....	....	220 00
Mountain	150 75	144 00	28 50	12 50	255 65	591 40
Winchester	438 25	147 05	41 50	28 00	273 05	927 85
DURHAM:						
Cartwright	119 50	54 00	59 50	22 50	192 40	447 90
Clarke Tp.	291 75	154 00	75 00	40 50	326 00	887 25
Millbrook	414 00	190 00	70 50	67 00	486 65	1,228 15
Port Hope	331 00	201 00	128 00	59 00	498 35	1,217 35
West Durham	310 50	201 00	167 00	60 00	588 25	1,326 75
ELGIN:						
Aldboro	205 50	126 75	91 50	22 50	266 20	712 45
Shedden	71 70	56 25	15 00	6 00	76 35	225 30
South Dorchester	133 50	70 25	15 00	2 00	308 70	529 45
Straffordville	87 00	39 75	19 75	9 75	135 90	292 15
West Elgin	444 50	245 00	55 00	34 00	327 38	1,105 88
ESSEX:						
Amherstburg, Anderdon & Malden	85 50	109 50	74 75	82 00	241 65	593 40
Colchester South	100 00	107 00	97 00	56 75	258 70	619 45
Comber	86 00	53 00	62 00	64 00	227 00	492 00
Essex Co.	655 75	366 00	179 50	218 00	742 05	2,161 30
Mersea, Leamington & S. Gosfield	253 00	136 75	217 00	148 00	702 90	1,457 65
Windsor	388 00	979 00	304 00	288 00	516 60	2,475 60

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Continued.*

Societies	Horses.	Cattle.	Sheep.	Swine.	Miscellaneous.	Total
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
FRONTENAC:						
Frontenac	162 00	78 00	29 00	39 50	179 50	488 00
Kennebec	44 00	16 50	14 25	11 75	54 15	140 65
Kingston Tp.	140 50	94 25	38 50	36 00	363 00	672 25
Parham	70 25	37 75	6 00	19 50	142 35	275 85
Storrington	67 00	54 60	8 40	15 25	197 50	342 75
Wolfe Island	79 75	17 50	15 50	9 00	131 50	253 25
GLENGARRY:						
Glengarry	100 00	106 50	33 75	14 00	123 20	377 45
Kenyon	214 50	104 75	24 75	19 00	202 20	565 20
St. Lawrence Valley	303 00	226 00	55 00	36 00	274 95	894 95
GRENVILLE:						
Kemptville	121 25	127 50	37 25	26 50	308 70	621 20
Merrickville	288 00	26 25	33 50	39 00	234 60	621 35
South Grenville	192 50	98 00	26 75	30 50	291 00	638 75
Spencerville	71 00	60 00	22 75	17 50	272 50	443 75
GREY:						
Ayton	156 00	45 00	28 50	30 00	195 75	455 25
Collingwood Tp.	202 00	111 00	19 50	17 00	211 90	561 40
Desboro	221 75	86 50	30 00	12 50	210 50	561 25
East Grey	(No	Fair)				
Egremont	154 75	85 50	38 25	47 50	224 75	550 75
Hanover, Bentinck & Brant	179 50	93 00	83 00	11 00	217 25	583 75
Holland	203 00	30 00	12 00	......	178 50	423 50
Keppel	45 00	23 75	12 00	4 00	109 65	194 40
Kilsyth	216 00	94 50	51 00	17 00	192 50	571 00
Markdale	213 50	90 00	92 00	30 00	252 27	677 77
Meaford & St. Vincent	174 37	155 50	30 00	14 62	255 30	629 79
Normanby	86 75	35 50	24 50	6 50	160 05	313 30
Osprey	113 00	74 50	65 00	20 50	137 25	410 25
Owen Sound	397 00	142 00	89 00	47 00	532 40	1207 40
Priceville	78 75	46 00	60 00	21 50	161 20	367 45
Proton	195 00	78 50	69 00	29 00	294 00	665 50
Rocklyn	107 50	120 00	34 50	27 00	200 50	489 50
South Grey	92 25	74 50	58 00	22 00	269 75	516 50
Sydenham	111 50	52 75	19 75	12 75	157 00	353 75
Walter's Falls	145 75	114 00	22 50	17 50	300 75	600 50
HALDIMAND:						
Caledonia	500 00	295 00	245 00	55 00	730 00	1825 00
Canboro	79 00	10 50	16 00	1 50	77 95	184 95
Dunnville	149 00	132 00	44 25	5 00	191 20	521 45
Haldimand	180 50	87 50	69 00	13 00	305 30	655 30
Southern Branch	142 50	25 50	21 75	11 50	200 20	401 45
Walpole	288 00	121 50	44 50	20 50	226 75	701 25
HALIBURTON:						
Glamorgan	22 25	5 40	3 40	1 40	50 50	82 95
Haliburton	80 25	48 50	15 25	8 00	183 05	335 05
Minden	56 15	49 00	30 50	15 00	158 60	309 25
HALTON:						
Acton	224 00	80 00	60 25	23 00	331 00	718 25
Esquesing	335 00	102 00	84 00	41 60	316 65	879 25
Halton	363 00	229 00	118 00	58 00	488 67	1256 67
Nelson & Burlington	235 00	46 00	26 00	9 00	396 25	712 25
Trafalgar	175 00	124 00	40 00	26 00	333 20	698 20
HASTINGS:						
Bancroft	83 00	61 50	57 00	6 00	228 39	435 89
Belleville	567 70	238 00	90 00	44 25	209 15	1149 10
Frankford	320 25	176 50	107 00	66 25	324 70	994 70
Madoc	317 75	96 70	25 00	30 25	303 95	773 65
Marmora	105 50	53 50	28 75	7 00	197 15	391 90
Maynooth	93 00	26 00	18 00	10 00	146 00	293 00
Shannonville	136 75	115 00	66 25	39 25	132 15	489 40
Stirling	240 50	109 25	44 75	36 50	259 30	690 30
Tweed	179 20	232 00	39 50	56 50	258 45	765 65
Wollaston	75 00	46 00	26 50	12 75	183 25	343 50

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Continued.*

Societies.	Horses.	Cattle.	Sheep.	Swine.	Miscellaneous.	Total.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
HURON:						
Bayfield	71 00	42 00	31 75	22 50	174 25	341 50
Blyth	108 50	75 00	19 50	2 00	214 25	419 25
Dungannon	125 00	55 25	18 50	21 50	197 00	417 25
East Huron	173 50	104 00	22 75	46 50	383 70	730 45
Exeter	166 00	80 00	49 00	22 00	351 92	668 92
Goderich Industrial	190 00	172 75	36 00	15 00	495 05	908 80
Howick	116 00	57 25	20 50	9 00	188 90	391 65
Seaforth	218 00	39 50	50 00	25 00	394 75	727 25
South Huron	(Spring	Fair	only			
Turnberry	139 00	79 00	24 50	22 00	280 80	545 30
Zurich	107 00	62 50	13 50	23 00	181 00	387 00
KENORA:						
Dryden	61 00	64 00	25 00	10 00	525 15	685 15
Kenora	50 00	95 00	....	....	606 00	751 00
KENT:						
Camden	121 50	40 25	55 50	31 00	145 90	394 15
East Kent	226 00	146 50	103 00	67 00	239 60	782 10
Harwich	181 00	66 50	59 25	37 00	264 50	608 25
Howard	235 00	152 00	126 00	80 00	367 70	960 70
Orford	207 50	126 25	114 50	60 25	225 35	733 85
Raleigh & Tilbury	140 00	88 75	57 50	30 50	143 60	460 35
Romney	122 75	67 00	66 00	59 00	188 15	502 90
Wallaceburg	94 00	64 00	41 50	7 00	174 30	380 80
West Kent	254 00	311 00	125 50	59 00	483 85	1,233 35
LAMBTON:						
Bosanquet	120 75	86 00	39 50	23 50	304 45	574 20
Brooke & Alvinston	238 50	121 75	63 50	20 75	413 90	858 40
East Lambton	140 65	145 75	80 50	60 25	378 85	805 90
Florence	182 50	72 25	48 50	37 75	141 75	482 75
Forest	147 30	115 50	78 50	54 50	292 50	688 30
Moore	261 00	187 50	68 00	35 00	261 95	813 45
Petrolia & Enniskillen	265 00	268 00	150 75	81 50	422 85	1,188 10
Plympton & Wyoming	82 75	57 25	52 75	47 50	256 55	496 80
Sombra	97 50	34 50	31 75	9 00	135 35	308 10
West Lambton	207 00	184 00	143 50	75 50	397 25	1,007 25
LANARK:						
Dalhousie	96 00	59 00	18 50	....	161 70	335 20
Lanark Tp.	108 75	81 00	13 25	15 75	199 90	418 65
Lanark Village & Bathurst.	204 84	34 10	20 06	15 94	314 31	589 25
Maberly	99 75	53 75	4 25	....	99 60	257 35
North Lanark	778 60	248 25	64 50	105 00	887 05	2,083 40
Pakenham	255 00	35 00	25 00	18 00	257 10	590 10
South Lanark	231 79	253 47	41 32	24 12	354 60	905 30
LEEDS:						
Brockville	302 73	211 33	69 33	76 83	651 17	1,311 39
Delta	102 40	150 40	63 41	37 20	368 15	721 56
Frankville	185 65	73 75	51 25	18 50	195 55	524 70
Lansdowne	145 00	96 25	15 50	20 50	270 50	547 75
Lombardy	105 00	45 50	19 00	12 45	145 40	327 35
North Crosby	....	....	....	....	118 45	118 45
Rear of Leeds & Lansdowne	33 63	22 59	11 92	12 55	60 09	140 78
LENNOX AND ADDINGTON:						
Addington	89 50	47 00	....	8 50	88 45	233 45
Amherst Island	76 55	45 85	10 25	7 50	31 45	171 60
Centreville	107 00	48 00	16 00	17 00	66 90	254 90
Ernestown	117 00	41 50	17 25	11 75	134 20	321 70
Lennox	199 00	81 50	64 50	68 00	501 15	914 15
LINCOLN:						
Abingdon	28 00	27 00	39 00	5 75	143 00	242 75
Clinton	177 00	78 50	40 00	20 50	416 30	732 30
Monck	97 00	49 00	45 00	11 00	192 00	394 00
Niagara Town & Tp.	118 00	....	....	....	243 90	361 90
Peninsular Central	107 25	30 25	15 25	2 50	158 50	313 75

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Continued.*

Societies.	Horses.	Cattle.	Sheep.	Swine.	Miscellaneous.	Total
MANITOULIN ISLAND:	$ c.	$ c.	$ c	$ c.	$ c.	$ c.
Billings	71 00	38 50	31 00	1 50	202 50	344 50
Gore Bay	104 25	77 50	57 00	32 25	265 50	536 50
Howland	43 75	22 75	19 75	16 00	103 00	205 25
Manitowaning	78 25	118 00	33 00	8 00	140 25	377 50
Providence Bay	75 25	30 50	13 00	2 50	148 50	269 75
MIDDLESEX:						
Caradoc	108 00	19 00	27 00	5 25	165 65	324 90
Delaware	147 00	95 00	59 50	25 00	192 75	519 25
Dorchester	323 00	207 00	81 25	26 00	135 00	772 25
London Tp.	128 00	53 00	24 50	7 00	129 50	342 00
McGillivray	97 50	22 50	12 00	3 50	93 75	229 25
Melbourne	324 00	107 25	41 50	20 00	185 35	678 10
Mosa & Ekfrid	240 50	165 00	61 25	30 50	235 25	732 50
North Middlesex	121 50	57 50	7 00	1 00	185 50	372 50
Parkhill	172 00	68 50	15 00	11 50	265 65	532 65
Strathroy	401 00	310 00	146 50	68 50	611 00	1,537 00
Thorndale	104 00	93 50	32 50	24 00	156 00	410 00
Westminster	152 00	55 00	36 00	20 00	167 50	430 50
MUSKOKA:						
Baysville	49 50	45 50	20 00	16 00	135 75	266 75
Gravenhurst & Muskoka	110 50	74 50	19 75	5 50	363 20	573 45
Medora & Wood	88 00	84 00	19 00	10 50	263 00	464 50
Morrison	62 00	34 75	7 25	7 50	109 05	220 55
North Muskoka	141 00	60 75	25 25	10 50	354 80	592 30
South Muskoka	317 00	186 00	115 00	69 00	605 50	1,292 50
Stephenson & Watt	128 00	45 00	22 75	6 50	287 80	490 05
Stisted	60 25	37 50	21 50	6 50	125 05	250 80
NIPISSING:						
Astorville	48 00	54 50	14 00	13 00	101 60	231 10
Bonfield	43 50	23 50	9 00	4 00	127 25	207 25
East Nipissing	73 50	85 50	18 00	37 00	261 25	475 25
Sturgeon Falls	175 50	90 25	28 00	35 50	121 00	450 25
Verner	70 00	173 00	3 00	37 00	198 40	481 40
NORFOLK:						
Charlotteville	144 50	89 75	9 50	3 00	226 85	473 60
Courtland	81 75	43 80	17 75	9 00	132 99	285 29
Houghton	109 25	86 00	34 00	14 50	187 30	431 05
Norfolk Co.	425 00	393 00	181 00	90 50	937 00	2,026 50
North Walsingham	85 00	59 00	7 75	10 25	143 50	305 50
Townsend	94 50	53 00	10 50	4 50	111 50	274 00
Windham	118 25	46 00	7 25	12 25	147 85	331 60
NORTHUMBERLAND:						
Alnwick	82 50	81 75	22 50	11 50	175 10	373 35
Brighton	289 00	86 00	84 00	42 00	167 80	668 80
Cobourg Central	188 00	211 50	50 00	26 00	285 25	760 75
Colborne	343 00	133 25	48 25	18 50	360 85	903 85
Cramahe	158 75	122 05	61 50	43 25	212 39	597 94
Percy Tp.	256 75	316 50	152 50	74 25	401 85	1,201 85
Seymour	156 00	140 75	55 25	36 25	186 45	574 70
Wooler	79 00	60 10	18 00	6 75	86 75	250 60
ONTARIO:						
Beaverton	204 50	65 00	46 50	12 50	197 00	525 50
Brock	204 50	127 50	90 00	26 50	329 50	778 00
Pt. Perry, Reach & Scugog.	190 00	82 00	45 00	31 00	210 50	558 50
Ramona	90 40	31 50	8 25	5 00	51 15	186 30
Scott	157 00	89 00	20 00	28 50	181 00	475 50
South Ontario	591 00	184 00	136 00	85 00	746 10	1,742 10
Uxbridge	455 00	162 00	78 00	37 00	143 00	875 00
OXFORD:						
Drumbo	269 00	69 00	127 00	26 00	526 60	1,017 60
East Nissouri	90 00	26 00	1 00	12 25	86 70	215 95
Ingersoll, N., & W. Oxford.	133 00	35 50	8 00	18 00	189 65	384 15

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Continued.*

Societies.	Horses.	Cattle.	Sheep.	Swine.	Miscellaneous.	Total.
OXFORD.—*Continued.*	$ c.	$ c.	$. c	$ c.	$ c.	$ c.
North Norwich	160 50	68 25	....	....	352 75	581 50
South Norwich	136 00	36 50	38 00	25 00	211 25	446 75
Tavistock	296 00	26 00	41 00	60 00	318 00	741 00
Tillsonburg & Dereham	279 00	166 50	54 00	48 00	372 00	919 50
West Zorra & Embro	169 50	74 00	12 50	37 00	139 00	432 00
Woodstock	347 00	290 00	129 00	123 00	839 00	1,728 00
PARRY SOUND:						
Armour, Ryerson & Burk's Falls	258 00	142 00	66 00	23 00	291 75	780 75
Christie	50 00	30 00	11 50	5 50	82 70	179 70
Loring	62 25	58 25	36 75	18 50	168 00	343 75
Machar	78 50	41 75	34 50	7 00	176 50	338 25
Magnetawan	54 50	49 00	64 50	7 00	276 25	451 25
McKellar	110 50	86 75	32 25	43 50	320 75	593 75
McMurrich	147 25	43 75	13 25	13 00	161 00	378 25
Parry Sound	172 00	104 00	37 50	5 00	314 10	632 60
Perry	73 00	71 00	43 50	10 00	241 50	439 00
Powassan	68 00	53 00	53 00	4 00	233 50	411 50
Rosseau	90 00	61 50	11 50	6 00	158 10	327 10
Strong	117 00	61 00	50 00	10 50	200 72	439 22
United Townships	47 50	49 25	39 50	17 00	156 50	309 75
PEEL:						
Albion & Bolton	308 00	113 00	73 00	38 00	340 75	872 75
Caledon	136 00	70 30	36 00	12 00	320 45	574 75
Cooksville	381 50	159 00	28 00	26 00	297 75	892 25
Peel	416 00	180 00	106 00	102 00	707 75	1,511 75
Toronto Gore	(Spring Show only)					
Toronto Tp.	506 50	230 50	82 50	19 00	463 63	1,302 13
PERTH:						
Elma	116 33	52 01	36 15	18 42	199 36	422 27
Fullarton, Logan & Hibbert	199 00	96 00	55 00	67 00	315 75	732 75
Kirkton	109 50	76 00	38 25	17 50	228 25	469 50
Listowel	140 00	48 00	27 75	26 50	163 05	405 30
Mornington	205 50	98 00	20 00	39 00	317 25	679 75
South Perth	97 50	49 00	36 00	23 50	300 25	506 25
Stratford	301 00	126 00	72 00	9 00	540 35	1,048 35
PETERBOROUGH:						
East Peterborough	189 00	325 00	117 25	64 50	503 95	1,199 70
Galway	26 25	4 00	....	1 75	106 75	138 75
Lakefield	142 00	53 00	51 75	16 00	152 55	415 30
Otonabee	177 80	88 25	54 50	21 75	136 85	479 15
Peterborough Industrial	677 00	419 00	232 00	115 00	794 75	2,237 75
PRESCOTT:						
Alfred	91 00	34 75	17 00	11 50	147 00	301 25
South Plantagenet	146 00	90 25	13 20	19 50	94 60	363 55
Vankleek Hill	336 98	330 00	42 50	65 00	466 40	1,240 88
PRINCE EDWARD:						
Ameliasburg	106 25	70 00	50 00	9 75	261 90	497 90
Prince Edward	487 50	255 00	171 00	73 00	937 59	1,924 09
Sophiasburg	109 25	52 25	32 75	6 00	142 75	343 00
RAINY RIVER:						
Rainy River Valley	318 00	89 00	48 00	62 00	562 25	1,079 25
RENFREW:						
Arnprior	288 50	234 00	7 00	12 00	116 50	658 00
Cobden	209 50	80 50	42 00	21 75	217 00	568 75
North Renfrew	475 00	170 00	55 00	70 00	353 25	1,123 25
Renfrew	868 00	428 00	80 50	62 00	747 32	2,185 82
RUSSELL:						
Casselman	90 00	47 75	10 50	8 00	41 80	198 05
Clarence	136 25	50 75	26 00	8 00	105 80	326 80
Russell	253 00	185 00	65 00	30 00	211 75	744 75
SIMCOE:						
Alliston	189 00	33 00	39 00	20 00	311 75	592 75
Barrie	373 00	128 00	118 00	62 00	762 25	1,443 25
Beeton	153 75	53 00	84 00	22 00	266 25	579 00

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Continued.*

Societies.	Horses.	Cattle.	Sheep.	Swine.	Miscellaneous.	Total.
SIMCOE.—*Continued.*	$ c	$ c.	$ c.	$ c	$ c.	$ c.
Bradford & W. Gwillimbury	172 00	66 00	86 00	24 00	301 20	649 20
Coldwater	125 50	113 00	40 50	10 00	220 25	509 25
Cookstown	194 00	44 00	113 00	35 00	262 00	648 00
East Simcoe	No Fair					
Flos Tp.	167 50	60 50	55 50	6 00	326 00	615 50
Nottawasaga & G. Northern	212 50	46 00	83 00	31 00	461 75	834 25
Oro	220 00	89 00	65 00	17 00	241 25	632 25
Tiny & Tay	No Fair					
STORMONT:						
Cornwall	284 00	154 00	39 25	6 00	467 75	951 00
Finch	113 00	46 25	3 75	11 00	123 55	297 55
Roxborough	216 50	134 75	14 25	6 50	210 80	582 80
Stormont	152 00	94 25	30 50	14 50	210 65	501 90
SUDBURY:						
Martland & Cosby	19 00	26 00	....	5 00	23 25	73 25
Massey	130 00	54 50	45 25	38 00	245 55	513 30
Warren	105 00	65 00	14 00	11 00	112 25	307 25
TEMISKAMING:						
Charlton	28 00	14 50	3 50	2 00	189 75	237 75
Cochrane	43 00	24 50	....	2 00	97 40	166 90
Englehart	41 00	43 00	6 00	6 00	168 00	264 00
Matheson	18 00	31 50	....	15 00	85 50	150 00
New Liskeard	129 50	65 75	13 00	6 00	586 75	801 00
THUNDER BAY:						
Oliver	142 50	95 25	7 50	14 50	361 75	621 50
West Algoma	286 00	249 00	18 00	32 00	2,153 00	2,738 00
Whitefish Valley	61 00	27 50	8 00	18 00	195 00	309 50
VICTORIA:						
Eldon	165 50	45 75	45 00	15 75	147 80	419 80
Fenelon	162 00	86 00	27 00	20 00	170 00	465 00
Mariposa	179 50	58 50	51 50	13 50	194 65	497 65
North Victoria	42 00	31 40	....	....	91 47	164 87
South Victoria	547 00	544 00	283 00	136 00	714 75	2,224 75
Verulam	199 75	102 50	58 25	45 00	256 33	661 83
WATERLOO:						
Elmira & Woolwich	166 00	123 00	11 00	21 00	234 25	555 25
South Waterloo	454 00	197 00	238 00	71 00	670 00	1,630 00
Wellesley & N. Easthope	193 50	60 50	58 00	31 00	341 80	684 80
Wilmot	289 00	39 50	53 00	29 50	359 35	770 35
WELLAND:						
Bertie	208 00	120 75	29 50	41 00	287 75	687 00
Fenwick	201 00	84 25	96 50	20 00	397 75	799 50
Stamford & Niagara Falls	No Fair					
Thorold Town & Tp.	212 50	39 00	28 75	3 00	237 45	520 70
Wainfleet	78 50	60 95	25 00	13 75	140 95	319 15
Welland	485 00	271 00	125 00	35 50	618 35	1,534 85
WELLINGTON:						
Arthur	214 00	94 50	33 00	32 00	318 50	692 00
Centre Wellington	261 00	259 00	51 00	10 00	497 75	1,078 75
Erin	295 50	178 00	72 00	29 50	504 59	1,079 59
Guelph & S. Wellington	No Fair					
Maryborough	77 50	45 50	6 50	2 00	170 95	302 45
Mt. Forest	319 00	191 00	95 00	59 00	327 05	991 05
Palmerston	159 50	65 00	25 00	29 00	182 75	461 25
Peel & Drayton	201 00	44 00	38 00	34 00	216 25	533 25
Puslinch	154 00	21 50	41 50	13 00	249 25	479 25
Rockwood	224 25	135 00	41 00	10 50	232 50	643 25
West Garafraxa	103 00	56 00	20 50	9 50	76 85	265 85
West Wellington	159 00	51 00	17 75	17 00	293 63	529 38
WENTWORTH:						
Ancaster	172 00	44 50	31 25	20 00	253 25	521 00
Binbrook	84 50	28 75	36 75	2 00	152 50	304 50
Hamilton and Wentworth	689 00	92 50	61 00	9 00	823 50	1,675 00

ANALYSIS OF PRIZE MONEY PAID BY AGRICULTURAL SOCIETIES.—*Concluded.*

Societies.	Horses.	Cattle.	Sheep	Swine.	Miscellaneous.	Total
WENTWORTH.—*Continued.*	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Rockton	438 00	93 00	105 50	40 00	460 25	1,136 75
Waterdown	152 00	109 00	....	21 00	372 95	654 95
West Flamboro	114 80	14 45	16 15	....	257 40	402 80
YORK:						
Markham	703 00	516 75	134 00	120 75	951 25	2,475 75
Newmarket	405 25	235 00	178 00	72 00	727 30	1,617 55
Queensville	96 00	69 00	55 00	35 00	196 50	451 50
Richmond Hill	430 00	31 00	26 00	43 00	102 75	632 75
Scarboro	324 00	165 00	73 00	34 00	513 00	1,109 00
Schomberg	292 98	98 00	67 00	50 00	375 25	882 25
Sutton	198 50	55 00	37 25	30 00	180 50	501 25
Weston, York & Etobicoke.	245 50	73 00	70 00	27 00	375 75	791 25
Woodbridge	504 00	104 00	211 00	47 00	836 50	1,702 50
INDIAN SOCIETIES:						
Six Nations	194 50	63 00	9 00	18 00	292 25	576 75
United Indians	23 00	19 50	....	3 00	51 60	97 10
CITIES:						
Canadian National, (Toronto)	9,802 00	8,472 00	2,974 00	2,683 00	13,213 00	37,144 00
Central Canada (Ottawa).	5,897 95	3,559 00	726 00	984 50	4,582 95	15,750 40
Western Fair (London).	3,577 00	3,662 00	1,707 00	1,360 00	5,435 50	15,741 50
	82,608 02	50,040 14	22,152 84	14,623 63	118,060 23	287,484 86

The Women's Section of an Exhibition.

REPORTS OF AGRICULTURAL SOCIETIES IN ONTARIO, SHOWING RECEIPTS AND EXPENDITURE FOR THE YEAR 1914.

Societies.	Receipts.							Expenditure.					
	Legislative grants.	Municipal grants.	Cash Donations.	Members' fees retained from 1913.	Members' fees paid in 1914.	Gate receipts at exhibitions.	Total actual receipts.	Total prize money paid in cash.	Special attractions.	Officers' salaries.	Total expenditure for agricultural purposes.	Total actual expenditure.	Value of land and buildings.
ALGOMA:	$	$	$	$	$	$	$	$	$	$	$	$	$
Bruce Mines	209	80	......	37	94	29	459	242	....	37	242	423	1,000
Central Algoma	794	1000	128	81	119	....	2,476	....	....	400	107	1,544	16,750
Iron Bridge	80	......	......	21	21	6	133	90	....	13	91	153	....
Johnston and Aberdeen	140	......	4	24	18	13	206	165	....	6	165	190	....
North Shore	156	......	5	26	19	19	286	128	....	22	156	266	287
St. Joseph Island	238	20	......	28	35	20	428	264	....	2	314	416	....
Thessalon	287	40	23	50	14	145	725	312	....	30	366	685	2,750
BRANT:													
Onondaga	127	125	129	30	68	102	762	428	....	37	453	720	50
Paris	379	150	223	73	266	680	2,250	1,284	25	219	1,302	2,016	9,110
South Brant	452	200	262	75	176	1093	2,855	1,447	103	243	1,483	2,714	4,200
BRUCE:													
Arran and Tara	317	200	42	123	74	497	1,525	1,048	....	72	1,068	1,561	1,900
Carrick	202	150	......	82	191	220	1,229	717	....	27	832	1,320	....
Chesley	216	150	116	94	63	306	1,067	575	110	50	628	1,101	....
Eastnor	113	125	15	74	34	122	743	281	47	22	358	747	435
Hepworth	144	120	21	109	78	233	805	516	....	27	620	884	250
Huron Tp.	210	125	82	88	57	514	1,596	657	306	67	734	1,767	3,000
Kincardine	119	75	120	74	75	544	1,291	433	343	95	447	1,154	....
Lucknow	194	130	160	112	23	354	1,338	649	67	50	699	1,252	1,000
N. Bruce and Saugeen	176	115	169	79	109	349	1,167	591	42	64	624	941	....
Northern	199	125	62	76	64	441	1,317	656	256	122	510	1,438	....
Paisley	228	150	19	89	35	460	1,317	701	45	100	701	1,254	....
Pinkerton	102	105	40	50	27	63	517	290	96	25	347	576	300
Teeswater	228	100	168	119	42	552	1,483	724	124	50	755	1,305	1,250
Tiverton	129	75	47	53	21	280	678	369	148	35	388	660	246
Underwood	157	125	37	79	18	140	668	451	14	37	477	605	200
Wiarton	171	165	37	....	175	259	1,021	501	25	77	552	992	2,575
CARLETON:													
Carleton Co.	417	800	......	....	321	624	2,612	1,689	311	160	1,714	3,778	5,100
Carp	286	500	254	102	21	549	1,982	756	60	80	756	1,567	6,625
Fitzroy	162	200	209	67	42	277	1,439	471	....	100	552	1,214	380

CARLETON.—*Continued.*													
Metcalfe	314	425	333	108	97	246	2,074	971	17	125	1,227	2,337	6,600
DUFFERIN:													
Dufferin	248	350	312	129	285	583	2,375	860	371	145	908	2,660	4,875
Dufferin Central	314	275	242	144	83	664	2,471	969	334	133	1,028	2,282	4,150
East Luther	221	275	76	98	99	607	2,240	729	277	75	771	2,760	5,600
DUNDAS:													
Dundas	92	......	253	60	114	507	1,378	220	492	60	220	1,352	1,675
Mountain	204	25	109	102	205	612	1,845	591	293	50	718	1,607	....
Winchester	317	......	177	96	134	518	1,938	928	221	100	978	2,364	5,190
DURHAM:													
Cartwright	143	47	1	67	94	191	586	448	10	25	448	569	....
Clark Tp.	223	134	44	93	61	474	1,520	887	58	100	1,018	2,018	2,750
Millbrook	319	280	65	131	68	770	2,200	1,228	183	115	1,254	2,203	6,950
Port Hope	251	258	127	111	171	705	2,200	1,217	40	80	1,351	2,461	1,321
West Durham	402	281	160	117	96	669	2,326	1,327	290	155	1,411	2,363	6,160
ELGIN:													
Aldboro'	250	135	149	113	43	608	1,708	712	203	74	761	1,495	4,112
Shedden	65	88	17	42	22	185	574	225	20	32	255	598	115
South Dorchester	158	112	10	....	262	233	1,095	529	61	65	606	1,150	....
Straffordville	94	19	10	5	124	215	558	292	125	30	306	540	712
West Elgin	357	121	97	137	44	930	2,200	1,106	95	60	1,156	1,931	2,600
ESSEX:													
Amherstburg, Anderdon & Malden	146	350	100	46	130	292	1,262	593	43	25	677	1,130	2,400
Colchester South	190	150	......	79	23	288	887	619	101	64	655	903	2,700
Comber	142	165	79	87	70	496	1,248	492	127	53	531	1,045	3,500
Essex Co.	598	480	542	138	221	1,480	4,202	2,161	320	175	2,290	4,198	10,900
Mersea, Leamington & S. Gosfield	383	250	108	128	872	1,411	3,727	1,458	436	71	1,459	2,835	9,550
Windsor	444	2,350	1,172	86	180	1,007	6,716	2,476	1,522	490	2,547	7,154	6,825
FRONTENAC:													
Frontenac	124	50	62	54	2	329	618	488	25	25	488	647	....
Kennebec	91	50	......	28	12	57	234	141	5	26	162	217	....
Kingston Tp.	196	360	418	55	179	1,290	2,729	672	675	125	779	833	....
Parham	156	50	22	42	34	226	649	276	103	23	297	586	800
Storrington	84	50	96	29	33	187	623	343	36	20	344	620	1,250
Wolfe Island	75	125	107	41	29	192	663	253	85	30	299	609	....
GLENGARRY:													
Glengarry	179	......	81	56	54	375	838	377	181	105	412	1,018	....
Kenyon	182	15	23	86	53	416	1,005	565	92	35	630	1,065	2,500
St. Lawrence Valley	278	......	108	113	120	600	1,334	970	12	45	952	1,175	3,025
GRENVILLE:													
Kemptville	199	150	128	81	27	443	1,071	621	71	50	639	1,156	1,625
Merrickville	204	150	98	121	36	418	1,245	621	53	79	627	1,276	1,692
South Grenville	205	150	70	62	163	239	3,151	639	1,535	105	657	3,271	....
Spencerville	137	137	59	66	42	386	1,235	444	195	50	445	1,062	1,700

REPORTS OF AGRICULTURAL SOCIETIES IN ONTARIO, SHOWING RECEIPTS AND EXPENDITURE FOR THE YEAR 1914.

Societies.	Receipts.							Expenditure.					
	Legislative grants.	Municipal grants.	Cash Donations.	Members' fees retained from 1913.	Members' fees paid in 1914.	Gate receipts at exhibitions.	Total actual receipts.	Total prize money paid in cash.	Special attractions.	Officers' salaries.	Total expenditure for agricultural purposes.	Total actual expenditure.	Value of land and buildings.
GREY:	$	$	$	$	$	$	$	$	$	$	$	$	$
Ayton	133	165	27	58	69	171	698	455	48	34	482	758	33
Collingwood Tp.	161	175	78	60	62	187	932	561	25	45	599	970	400
Desboro	163	115	51	79	103	251	899	561	38	38	590	931	235
East Grey	130	90	35	37	55	....	348	....	26	58	7	168	1,850
Egremont	151	75	68	79	45	291	979	551	55	32	576	1,045	2,230
Hanover, Bentinck & Brant	150	75	123	66	34	531	1,138	584	290	60	610	1,284	10,200
Holland	129	130	86	73	128	230	785	423	106	30	497	838	800
Keppel	90	100	45	64	26	67	482	194	....	50	259	477	75
Kilsyth	204	125	114	80	146	318	1,236	571	....	35	738	1,101	2,530
Markdale	159	75	188	94	123	428	1,382	678	196	91	716	1,433	381
Meaford & St. Vincent	178	775	116	74	76	447	2,107	630	35	19	664	1,508	12,050
Normanby	92	110	1	68	44	110	483	313	23	28	338	501	....
Osprey	136	115	7	67	18	276	815	410	120	48	480	845	927
Owen Sound	344	175	338	134	76	938	2,520	1,331	145	110	1,396	2,401	5,600
Priceville	101	15	12	56	22	146	561	367	99	32	407	700	850
Proton	201	75	13	117	58	288	1,388	665	15	105	776	1,353	3,550
Rocklyn	161	125	37	60	65	351	1,148	489	89	56	577	1,101	3,850
South Grey	179	75	88	61	84	451	1,282	516	210	60	558	1,284	4,300
Sydenham	96	125	18	56	115	72	604	354	....	37	357	591	500
Walter's Falls	147	140	234	63	130	156	1,234	600	40	55	694	1,316	1,300
HALDIMAND:													
Caledonia	539	50	30	93	113	2,813	4,618	1,825	685	233	1,966	4,835	7,370
Canboro	47	75	26	18	44	74	398	185	11	12	185	358	1,100
Dunnville	173	150	50	....	127	921	1,655	521	342	100	553	1,162	4,300
Haldimand	211	125	199	....	277	505	1,768	655	330	93	713	1,712	4,000
Southern Branch	108	75	39	....	125	203	647	403	25	37	435	699	400
Walpole	184	150	219	....	360	198	1,485	701	25	65	714	1,172	550
HALIBURTON:													
Glamorgan	68	......	......	15	22	....	104	83	....	....	83	94	....
Haliburton	243	75	51	57	52	90	624	335	238	35	342	650	....
Minden	265	......	21	40	14	106	447	309	35	20	330	436	745

HALTON:													
Acton	300	75	592	......	367	511	2 057	718	235	50	718	1,339	40
Esquesing	236	150	232	80	30	520	1,607	879	187	79	912	1,508	150
Halton	380	350	374	103	361	916	2,909	1,257	253	185	1,356	3,446	10,700
Nelson & Burlington	203	275	235	69	164	453	1,690	712	42	60	738	1,262	110
Trafalgar	248	475	530	86	122	813	3,006	698	84	25	773	2,955	9,000
HASTINGS:													
Bancroft	227	......	32	65	37	345	816	436	15	53	482	730	1,685
Belleville	361	300	197	63	61	1,064	2,597	1,149	905	153	1,151	3,016	......
Frankford	302	100	215	81	52	590	1,705	995	......	100	1,086	1,795	5,200
Madoc	211	......	184	138	39	582	1,573	774	96	81	862	1,649	157
Marmora	145	......	......	80	26	331	720	392	15	50	418	657	1,640
Maynooth	153	......	21	33	21	70	431	293	......	24	334	466	......
Shannonville	135	20	67	40	70	520	998	489	138	70	500	889	425
Stirling	201	20	175	95	43	420	1,272	690	25	74	792	1,222	605
Tweed	227	100	126	103	53	639	1,370	766	188	55	766	1,482	......
Wollaston	174	35	61	46	54	163	596	343	26	25	344	649	1,981
HURON:													
Bayfield	102	45	29	58	79	229	710	341	110	37	341	619	1,400
Blyth	157	78	63	74	48	454	1,053	419	170	50	477	1,085	2,830
Dungannon	140	25	10	111	19	434	1,026	417	231	64	418	1,038	......
East Huron	208	45	63	128	58	726	1,806	730	309	75	792	2,200	5,700
Exeter	210	55	7	73	113	525	1,265	669	35	60	733	1,364	3,418
Goderich Industrial	264	125	99	104	96	1,310	2,412	909	967	100	939	2,637	......
Howick	135	50	1	60	34	301	670	392	......	35	427	618	500
Seaforth	201	25	42	93	125	513	1,378	727	85	72	776	1,517	2,100
South Huron	Spring	Fair	only										
Turnberry	203	83	24	81	25	453	1,289	545	91	75	596	1,436	930
Zurich	121	25	......	87	134	258	737	387	70	33	387	679	1,600
KENORA:													
Dryden	362	......	203	53	21	103	885	685	......	53	760	1,116	1,100
Kenora	512	350	411	......	128	288	1,964	751	60	127	751	1,839	247
KENT:													
Camden	134	165	18	78	77	688	1,342	394	135	54	395	941	3,200
East Kent	218	100	101	108	135	526	1,345	782	150	80	806	1,387	6,150
Harwich	203	225	76	93	53	540	1,664	608	261	107	669	1,389	3,750
Howard	302	250	27	114	69	1,661	2,898	961	331	125	994	2,443	5,400
Orford	236	200	34	115	102	324	1,368	734	32	60	795	1,380	3,000
Raleigh & Tilbury	167	215	70	71	83	228	1,107	460	152	51	485	1,091	2,900
Romney	128	200	......	86	96	435	1,035	503	100	52	503	976	3,100
Wallaceburg	122	260	......	58	28	337	1,185	381	157	70	446	1,166	3,645
West Kent	389	510	388	72	99	1,334	4,836	1,233	826	459	1,316	4,873	12,750
LAMBTON:													
Bosanquet	159	165	50	74	180	274	1,214	574	151	50	645	1,116	2,275
Brooke & Alvinston	258	250	65	128	59	701	2,447	858	99	80	938	1,728	6,575

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Societies.	Receipts.							Expenditure.					
	Legislative grants.	Municipal grants.	Cash Donations	Members' fees retained from 1913.	Members' fees paid in 1914.	Gate receipts at exhibitions.	Total actual receipts.	Total prize money paid in cash.	Special attractions.	Officers' salaries.	Total expenditure for agricultural purposes.	Total actual expenditure.	Value of land and buildings.
	$	$	$	$	$	$	$	$	$	$	$	$	$
LAMBTON.—*Continued.*													
East Lambton	268	100	52	84	60	889	1,654	806	342	55	864	1,574	700
Florence	159	175	56	91	129	173	1,093	482	30	52	568	976	2,600
Forest	187	265	79	59	186	523	1,767	688	201	52	704	1,457	4,575
Moore	274	250	139	94	355	652	1,940	813	197	54	861	1,604	750
Petrolea & Enniskillen	375	500	......	107	59	829	2,019	1,188	301	100	1,239	2,279	3.060
Plympton & Wyoming	160	150	25	51	112	189	847	497	2	40	562	756	1,720
Sombra	117	100	54	73	46	164	742	308	5	50	370	781	1,225
West Lambton	361	250	966	100	54	1,446	4,289	1,007	971	210	1,071	4,073	6,009
LANARK:													
Dalhousie	117	50	......	56	151	172	861	335	19	50	351	762	1,990
Lanark Tp.	132	50	148	53	48	301	1,602	419	10	79	450	1,558	1,495
Lanark Village & Bathurst	223	100	188	70	31	481	1,195	589	156	106	630	1,228	....
Maberly	74	50	77	42	79	175	759	257	48	49	280	777	1,440
North Lanark	623	425	522	68	373	1,743	4,302	2,083	604	205	2,137	4,507	18,250
Pakenham	171	75	133	66	147	348	1,030	590	35	42	599	974	2.175
South Lanark	353	275	1,056	150	49	1,177	5,289	905	937	135	905	5,366	14,550
LEEDS:													
Brockville	700	150	1,001	138	75	1,698	4,949	1,311	1,116	280	1,353	4,761	3,520
Delta	240	150	82	179	39	690	1,656	722	330	80	727	1,768	4,125
Frankville	202	175	35	240	22	320	968	525	116	50	554	917	800
Lansdowne	182	150	108	84	51	735	1,814	548	335	75	624	2,956	7,375
Lombardy	114	114	20	156	20	203	830	327	....	40	345	868	151
North Crosby	71	71	265	69	13	....	328	142	27	37	142	268	....
Rear of Leeds & Lansdowne	44	44	63	41	49	190	762	141	194	55	146	772	563
LENNOX & ADDINGTON:													
Addington	47	50	......	36	11	245	460	233	104	30	242	507	....
Amherst Island	140	......	60	23	38	28	307	172	....	15	178	315	....
Centreville	82	100	7	39	52	187	496	255	15	25	264	462	....
Ernestown	89	50	49	46	36	458	927	322	15	36	323	756	2,500
Lennox	296	25	35	52	117	837	1,591	914	70	110	960	2,126	2,950

LINCOLN:													
Abingdon	70	75	45	58	50	188	580	243	68	40	243	551	1,200
Clinton Tp.	199	250	......	....	259	595	1,592	732	50	60	766	1,374	4,440
Monck	55	75	......	53	38	167	429	394	45	37	402	665	1,880
Niagara Town & Tp.	108	155	111	42	86	32	642	362	123	40	362	710	....
Peninsular Central	107	125	46	63	63	471	980	314	168	70	315	998	2,750
MANITOULIN:													
Billings	377	25	3	59	9	107	601	344	....	30	349	490	2,575
Gore Bay	478	......	64	78	30	216	951	536	....	69	558	833	2,125
Howland	193	......	......	47	19	99	459	205	....	27	205	395	700
Manitowaning	279	......	28	43	13	123	501	377	....	40	403	502	700
Providence Bay	215	......	26	41	14	127	426	270	....	10	270	331	420
MIDDLESEX:													
Caradoc	110	150	115	42	115	249	1,151	325	214	35	411	1,640	1,912
Delaware	149	125	177	....	124	309	1,197	519	159	35	547	1,153	350
Dorchester	215	50	137	....	162	677	1,399	772	159	104	829	1,341	1,145
London Tp.	109	200	160	60	46	322	1,042	342	135	40	361	894	1,700
McGillivray	71	20	39	46	16	96	403	229	....	25	254	394	....
Melbourne	300	150	178	94	230	627	1,803	678	397	25	691	1,807	2,060
Mosa & Ekfrid	203	150	136	98	79	576	1,790	732	245	60	768	1,508	4,630
North Middlesex	121	50	79	67	49	258	892	372	55	75	399	827	700
Parkhill	128	50	232	86	77	364	1,201	533	172	55	533	1,151	2,500
Strathroy	480	275	283	98	124	1,239	4,063	1,537	545	104	1,596	3,831	11,950
Thorndale	121	125	171	59	168	391	1,333	410	138	85	438	1,007	1,050
Westminster	118	125	146	35	154	245	867	430	151	50	455	844	100
MUSKOKA:													
Baysville	179	......	13	32	13	6	249	267	....	15	274	325	25
Gravenhurst & Muskoka	404	10	58	53	28	136	777	573	25	100	636	898	350
Medora & Wood	338	50	35	53	43	54	684	464	....	35	526	747	....
Morrison	143	......	26	40	17	64	313	221	....	....	221	310	1,055
North Muskoka	448	80	171	77	44	210	1,092	592	39	58	622	1,223	3,335
South Muskoka	789	100	406	122	29	589	2,793	1,292	729	90	1,386	2,793	1,505
Stephenson & Watt	348	50	65	55	30	144	892	420	30	63	571	867	1,025
Stisted	230	15	15	40	11	25	367	251	....	27	252	383	1,035
NIPISSING:													
Astorville	204	......	......	17	24	....	314	231	....	32	231	322	600
Bonfield	198	20	......	27	16	....	364	207	....	30	232	354	1,160
East Nipissing	426	60	239	39	44	108	891	475	....	70	489	848	1,225
Sturgeon Falls	303	300	......	47	23	169	1,017	450	20	70	450	673	4,500
Verner	336	35	......	54	33	123	874	481	....	20	557	798	....
NORFOLK:													
Charlotteville	155	......	53	10	110	320	720	474	....	67	517	739	6,150
Courtland	88	25	35	22	183	142	686	285	....	38	365	718	....
Houghton	114	......	23	....	200	412	1,026	431	....	137	529	970	1,410
Norfolk Co.	593	......	625	....	425	1,653	3,857	2,026	283	275	2,128	4,461	14,100

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Norfolk.—*Continued.*	$	$	$	$	$	$	$	$	$	$	$	$	$
North Walsingham	25	17	15	11	157	159	565	305	....	52	330	563	2,275
Townsend	80	......	48	....	108	189	674	274	75	75	275	641	1,800
Windham	103	......	10	31	93	150	500	332	15	45	344	528	325
Northumberland:													
Alnwick	133	44	20	50	17	270	640	373	109	45	428	656	825
Brighton	182	85	85	85	68	447	1,218	669	....	50	669	1,112	100
Cobourg Central	332	109	168	84	26	183	1,693	761	117	95	818	1,234	20,726
Colborne	281	93	266	66	11	496	1.367	904	114	52	911	1,285	825
Cramahe	149	99	34	65	38	249	866	598	47	40	598	836	850
Percy Tp.	342	132	183	119	37	815	1,814	1,202	190	75	1,215	1,724	3,825
Seymour	185	261	76	85	173	535	1,403	575	207	102	675	1,589	2,450
Wooler	98	182	26	58	42	324	805	251	158	25	319	1,159	175
Ontario:													
Beaverton	167	260	314	67	99	607	1,686	525	701	83	551	2,939	3,300
Brock	256	160	195	81	48	352	1,440	778	254	55	783	1,518	....
Pt. Perry, Reach & Scugog	143	125	383	136	154	595	1,394	558	353	34	564	1,839	....
Ramona	38	10	50	23	41	25	197	186	....	16	186	232	386
Scott	128	75	161	45	65	201	885	475	35	52	498	876	....
South Ontario	463	325	706	137	88	2,469	5,283	1,742	814	155	1,763	5,988	7,450
Uxbridge	203	85	230	57	66	740	1,852	875	83	154	875	2,048	....
Oxford:													
Drumbo	310	56	44	60	94	595	1,707	1,018	....	77	1.076	1,618	342
East Nissouri	72	55	69	20	208	124	750	216	109	44	256	668	....
Ingersoll, N. & W. Oxford	160	56	111	....	167	329	1,250	384	240	75	436	1,074	1,900
North Norwich	200	140	263	61	197	76	1,823	581	383	60	632	1,647	2,000
South Norwich	153	80	49	....	163	221	845	447	152	52	473	879	170
Tavistock	229	72	85	98	51	414	1,266	741	142	42	765	1,250	300
Tillsonburg & Dereham	237	56	80	52	289	866	2,121	919	257	155	960	2,000	....
West Zorra & Embro	131	55	......	54	230	320	1,127	432	60	47	527	941	350
Woodstock	509	256	1,449	82	1,006	1,851	25064	1,728	798	300	1,764	35,619	28,300

PARRY SOUND:													
Armour, Ryerson, & Burk's Falls.	564	100	194	105	42	223	1,464	781	50	78	884	1,423	3,325
Christie	169	......	2	39	80	29	410	180	....	20	184	354	415
Loring	300	......	25	62	6	68	537	344	16	24	379	548	420
Machar	304	......	59	46	35	68	899	338	....	27	428	916	2,825
Magnetawan	339	25	92	58	10	55	732	451	11	22	495	720	650
McKellar	386	25	12	115	12	63	843	594	....	24	620	841	1,715
McMurrich	366	25	108	58	11	55	918	378	....	53	446	834	1,450
Parry Sound	412	210	83	67	49	240	1,256	633	11	....	694	1,368	9,905
Perry	391	50	72	57	63	57	930	439	....	35	501	898	2,445
Powassan	379	......	56	55	10	109	784	411	....	62	540	787	1,336
Rosseau	221	......	50	42	7	48	357	327	....	32	334	414	30
Strong	380	......	23	54	30	137	735	439	....	25	502	693	850
United Townships	214	......	9	34	12	39	361	310	....	17	311	430	....
PEEL:													
Albion & Bolton	296	300	45	108	56	525	1,637	873	237	60	905	1,596	2,200
Caledon	192	230	137	90	75	201	1,030	575	103	80	585	1,052	733
Cooksville..........................	232	75	161	139	78	669	1,522	892	45	90	947	1,810	1,000
Peel	448	410	309	102	221	553	2,964	1,512	30	184	1,550	3,014	5,250
Toronto Gore	Spring	Fair	only										
Toronto Tp.	356	250	421	133	112	438	2,126	1,312	170	83	1,350	2,189	2,900
PERTH:													
Elma	125	35	38	65	36	130	881	422	40	62	452	920	1,450
Fullarton, Logan & Hibbert	246	461	42	101	89	485	1,830	733	67	56	803	1,710	....
Kirkton	156	110	54	75	280	281	1,251	469	74	50	583	1,140	2,450
Listowel	171	12	37	92	24	219	886	405	130	....	437	851	2,000
Mornington	196	91	......	86	318	569	1,547	680	294	106	681	1,508	4,050
South Perth	184	337	151	50	114	262	1,444	506	30	100	531	3,312	5,500
Stratford	280	106	150	121	281	622	2,760	1,048	583	125	1,094	3,270	....
PETERBOROUGH:													
East Peterborough	361	175	89	92	59	1,107	2,079	1,200	157	104	1,211	2,088	3,010
Galway	51	75	81	36	28	184	534	139	35	25	139	433	....
Lakefield	130	180	63	80	26	396	1,012	443	85	25	427	1,449	2,925
Otonabee	131	75	46	79	21	264	782	479	93	37	519	840	1,150
Peterborough Industrial	628	775	171	154	91	2,846	6,140	2,238	1,001	125	2,306	5,630	3,540
PRESCOTT:													
Alfred	100	75	75	81	39	377	1,063	301	296	35	326	1,093	2,400
South Plantagenet..................	96	75	40	60	22	302	634	364	17	40	398	633	275
Vankleek Hill	366	75	185	100	115	953	2,208	1,241	400	102	1,241	2,340	8,100
PRINCE EDWARD:													
Ameliasburg	162	......	......	71	40	388	766	498	....	62	524	763	....
Prince Edward	482	300	235	84	798	2,076	5,743	1,924	870	179	2,005	8,503	24,800
Sophiasburg	116	......	75	60	25	224	592	343	....	25	368	547	....
RAINY RIVER:													
Rainy River Valley	590	275	1,211	99	57	238	2,888	1,079	156	50	1,209	2,316	3,480

REPORTS OF AGRICULTURAL SOCIETIES IN ONTARIO, SHOWING RECEIPTS AND EXPENDITURE FOR THE YEAR 1914

Societies.	Receipts.							Expenditure.					
	Legislative grants.	Municipal grants.	Cash Donations.	Members' fees retained from 1913.	Members' fees paid in 1914.	Gate receipts at exhibitions.	Total actual receipts.	Total prize money paid in cash.	Special attractions.	Officers' salaries.	Total expenditure for agricultural purposes.	Total actual expenditure.	Value of land and buildings.
	$	$	$	$	$	$	$	$	$	$	$	$	$
RENFREW:													
Arnprior	167	200	337	75	254	411	1,965	658	101	75	708	1,540	3,800
Cobden	183	165	146	78	46	473	1,858	569	70	45	674	2,014	7,350
North Renfrew	381	100	363	97	141	706	2,266	1,123	59	108	1,247	2,369	19,250
Renfrew	623	625	381	77	374	1,981	6,242	2,186	272	200	2,277	6,109	19,200
RUSSELL:													
Casselman	59	75	428	38	40	414	1,244	198	749	65	207	1,707	4,300
Clarence	95	100	53	61	61	238	661	327	....	50	327	565	1,015
Russell	206	125	274	102	79	720	1,917	745	116	67	841	1,949	4,300
SIMCOE:													
Alliston	137	15	10	71	91	580	1,074	593	225	30	623	1,837	....
Barrie	425	150	540	148	125	1,272	3,358	1,443	559	185	1,534	3,341	....
Beeton	205	40	250	78	83	287	1,440	579	263	124	594	1,377	2,550
Bradford & W. Gwillimbury	211	......	101	125	210	756	1,743	649	396	84	651	1,945	6,000
Coldwater	130	75	180	70	32	645	1,337	509	255	50	519	1,293	2,575
Cookstown	258	75	120	152	43	300	1,193	648	190	90	676	1,301	1,300
East Simcoe	No	fair	......	....	....	....	......	....	....	....	....	....	....
Flos Tp	187	......	109	96	69	825	1,783	615	453	110	649	1,604	4,425
Nottawasaga and G. Northern	224	350	430	100	109	1,427	3,032	834	612	275	930	2,689	....
Oro	177	100	120	96	80	393	1,032	632	....	54	633	1,062	366
Tiny & Tay	No	fair	......	....	....	....	......	....	....	....	....	....	....
STORMONT:													
Cornwall	262	525	328	114	195	1,300	3,327	951	601	200	967	2,717	3,450
Finch	75	50	40	44	32	157	458	298	5	16	306	500	300
Roxborough	132	100	160	56	133	391	1,139	583	99	20	583	1,024	....
Stormont	118	......	164	....	129	219	669	502	20	22	505	732	525
SUDBURY:													
Martland & Cosby	52	......	......	....	63	....	147	73	6	11	73	100	....
Massey	387	......	17	64	85	241	902	513	....	98	556	1,026	1,550
Warren	298	25	......	43	14	66	538	307	17	35	307	623	1,000

TEMISKAMING:													
Charlton	238	......	61	40	40	122	654	238	2	50	268	511	2,035
Cochrane	138	......	35	....	236	83	565	167	42	25	167	499	200
Englehart	276	200	220	47	31	126	948	264	31	29	308	753	3,425
Matheson	189	......	78	21	113	....	397	150	....	....	151	331	1,220
New Liskeard	535	150	90	93	76	319	1,453	801	70	79	851	1,522	6,050
THUNDER BAY:													
Oliver	423	50	209	98	39	232	1,514	621	170	62	646	1,321	5,153
West Algoma	900	3,000	100	233	139	2,814	9,810	2,738	1,561	710	2,738	10,677	41,182
Whitefish Valley	209	......	52	63	30	60	681	309	....	50	334	772	333
VICTORIA:													
Eldon	137	75	97	55	49	238	880	420	65	60	456	973	50
Fenelon	142	110	62	57	19	131	650	465	15	....	500	633	....
Mariposa	117	50	54	61	53	215	739	498	45	40	503	795	....
North Victoria	60	110	13	21	45	40	406	165	83	47	177	417	875
South Victoria	702	100	502	121	170	3,839	6,658	2,225	1,312	290	2,243	5,643	19,100
Verulam	254	75	119	89	38	481	1,682	662	102	25	770	1,564	5,790
WATERLOO:													
Elmira & Woolwich	132	100	238	84	44	351	1,242	555	105	49	555	244	4,500
South Waterloo	493	530	534	....	287	394	2,907	1,630	95	165	1,736	3,095	1,300
Wellesley & N. Easthope	221	121	110	82	27	290	1,000	685	40	50	737	1,075	1,800
Wilmot	198	200	290	98	75	484	1,644	770	31	79	794	1,597	200
WELLAND:													
Bertie	210	190	410	25	97	131	1,387	687	163	60	888	1,412	....
Fenwick	228	250	111	67	167	1,132	2,451	799	453	80	824	2,549	4,965
Stamford & Niagara Falls	No	fair	......	60	....	....	210	....	....	110	....	182	....
Thorold Town & Tp.	154	450	396	70	87	1,054	2,582	521	496	108	522	2,415	10,850
Wainfleet	99	225	86	59	27	64	549	319	....	50	330	540	150
Welland	352	350	176	74	258	2,313	3,926	1,535	345	172	1,576	3,730	19,400
WELLINGTON:													
Arthur	165	110	105	109	60	554	1,715	692	130	115	711	1,549	2,200
Centre Wellington	298	100	251	104	180	574	2,089	1,079	154	104	1,165	2,110	1,550
Erin	346	......	115	113	300	179	1,997	1,080	69	98	1.184	2,179	2,400
Guelph & S. Wellington	736	75	333	68	16	....	1,636	....	....	50	....	1,091	....
Maryborough	72	......	......	61	57	105	394	284	67	20	284	422	....
Mount Forest	301	60	221	184	116	479	1,973	991	114	60	1,089	1,765	2,800
Palmerston	111	110	128	70	39	165	858	461	30	52	472	832	2,525
Peel & Drayton	138	55	138	79	55	463	1,234	533	182	74	560	1,441	1,800
Puslinch	164	......	......	....	477	199	990	479	35	56	515	1,153	200
Rockwood	171	25	215	76	74	483	1,272	643	44	62	682	1,205	....
West Garafraxa	105	70	70	51	22	75	468	266	33	25	271	480	....
West Wellington	153	80	156	95	88	301	1,073	529	134	64	541	1,176	1,275

REPORTS OF AGRICULTURAL SOCIETIES IN ONTARIO, SHOWING RECEIPTS AND EXPENDITURE FOR THE YEAR 1914.

Societies.	Receipts.							Expenditure.					
	Legislative grants.	Municipal grants.	Cash Donations.	Members' fees retained from 1913.	Members' fees paid in 1914.	Gate receipts at exhibitions.	Total actual receipts.	Total prize money paid in cash.	Special attractions.	Officers' salaries.	Total expenditure for agricultural purposes.	Total actual expenditure.	Value of land and buildings.
WENTWORTH:	$	$	$	$	$	$	$	$	$	$	$	$	$
Ancaster	160	225	123	50	133	592	1,661	521	158	105	521	1,443	4,380
Binbrook	83	60	171	67	62	117	628	304	105	40	305	606	....
Hamilton and Wentworth	429	450	1,119	....	333	759	3,946	1,675	497	183	1,682	3,838	....
Rockton	338	175	161	2	310	661	2,399	1,137	253	125	1,147	2,493	....
Waterdown	212	130	166	51	150	231	1,184	655	40	45	712	1,185	....
West Flamboro	159	100	160	59	85	64	960	403	....	77	428	905	127
YORK:													
Markham	736	275	882	153	173	2,454	6,182	2,476	733	370	2,598	5,959	16,150
Newmarket	458	225	793	136	94	1,549	3,990	1,61$	769	175	1,618	3,882	9,350
Queensville	134	50	145	48	62	132	580	451	23	35	451	645	....
Richmond Hill	173	85	145	58	74	649	1,636	633	89	79	661	1,481	2,900
Scarboro	290	50	790	94	117	204	1,880	1,109	30	115	1,165	1,902	51
Schomberg	370	70	184	104	45	357	1,553	882	172	52	908	1,882	2,500
Sutton	141	120	314	72	81	287	1,237	501	239	60	502	1,171	2,000
Weston, York & Etobicoke	239	175	575	108	154	1,106	3,210	791	470	100	831	3,954	1,800
Woodbridge	533	250	374	140	88	2,478	4,905	1,702	302	200	1,771	3,412	15,150
INDIAN SOCIETIES:													
Six Nations	100	......	21	33	148	684	1,328	577	270	74	612	1,226	3,075
United Indian	100	50	......	34	8	94	297	97	106	15	112	294	....
Totals	77,941	49,049	50,244	23,859	33,490	159,236	514,270	218,127	56,997	24,630	232,159	536,133	954,164

TENTH ANNUAL REPORT

OF THE

Horticultural Societies

OF ONTARIO

FOR THE YEAR

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1916

Printed by
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Corner Queen and John Streets
TORONTO

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario, etc., etc.,

MAY IT PLEASE YOUR HONOUR:

I have the honour to present herewith for your consideration the Report of the Horticultural Societies of Ontario for the year 1915.

Respectfully yours,

JAS. S. DUFF,

Minister of Agriculture.

TORONTO, 1916.

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ANNUAL REPORT

OF

The Horticultural Societies of Ontario

1915

To the Honourable Jas. S. Duff, Minister of Agriculture.

SIR,—The Tenth Annual Report of the Horticultural Societies of Ontario, which I have the honour to present herewith, shows that these organizations are making rapid strides towards the betterment and beautification of the homes of this Province, and marked improvement is noted on every hand in cities, towns, and villages, where branches of this Association have been formed. A number of new societies have been organized, and membership largely increased. The proceedings of the largest and best Convention yet held are embodied in this Report, and also complete statistics of the receipts and expenditures of all the societies are hereto appended.

Faithfully yours,

J. LOCKIE WILSON,

Superintendent.

OFFICERS, 1916

President	REV. G. W. TEBBS, Hamilton.
First Vice-President	DR. F. E. BENNETT, St. Thomas.
Second Vice-President	PROF. CROW, O.A.C., Guelph.
Secretary and Editor	J. LOCKIE WILSON, Toronto.
Treasurer	C. A. HESSON, St. Catharines.

Directors: District No. 1, Rev. A. H. SCOTT, Perth; 2, H. J. CLARK, Belleville; 3, R. WHORLEY, Haileybury; 4, T. D. DOCKRAY, Toronto; 5, JAS. OGILVIE, Hamilton; 6, WM. HARTRY, Seaforth; 7, R. W. BROOKS, Brantford; 8, DR. J. A. BOTHWELL, Stratford; 9, W. E. GIGNAC, Sandwich.

Honorary Director: J. H. BENNETT, Barrie.

Auditors: MRS. R. B. POTTS, Hamilton, and MISS MARY YATES, Port Credit.

Representatives to C. N. E.: W. B. BURGOYNE, St. Catharines.

Representatives to American Civic Association: Rev. A. H. SCOTT, Perth; J. LOCKIE WILSON, Toronto, and MRS. CADWELL, Windsor.

Committee on Names and Varieties: H. J. MOORE, Niagara Falls, Chairman; F. E. BUCK, C. E. F., Ottawa, Secretary; MISS M. E. BLACKLOCK, Toronto; PROF. W. T. MACOUN, C. E. F., Ottawa; WM. HUNT, O. A. C., Guelph; O. J. ROBBS, Vineland Station; JNO. CAVERS, Oakville; J. C. CROMBIE, St. Thomas.

Representative to Conservation Commission: R. B. WHYTE, Ottawa.

TREASURER'S REPORT

FOR THE YEAR ENDING NOVEMBER 10TH, 1915.

Receipts.

Balance on hand as per statement, November 11th, 1914		$167 96
Affiliation Fees, including arrears		224 00
Exchange allowed on Fee		15
Bank Interest to 30th November, 1914	$1 16	
Bank Interest to 31st May, 1915	95	
		2 11
		$394 22

Expenditures.

Honorarium, Secretary	$50 00
Assistant, services at Convention, 1914	5 00
Stenographer's services, 1914	3 00
Caretaker of Convention Hall, 1914	5 00
Ambrose Kent & Co., badges	2 00
Moore, Telford Co., letter heads	5 00
Rev. A. H. Scott, Delegate to American Civic Association	25 00
W. B. Burgoyne, Delegate to American Civic Association	25 00
National Council of Women, affiliation fee	2 00
Bryant Press, printing cards	3 00
American Civic Association, affiliation fee	5 00
B. C. Fairfield & Son, receipt forms	20
Exchange on Cheques (affiliation fees)	4 01
Treasurer's Account for Postage	3 25
Balance on hand	256 76
	$394 22

C. A. HESSON, *Treasurer.*

St. Catharines, November 10th, 1915.

Audited and found correct.
J. S. MOORCRAFT, } *Auditors.*
ADA L. POTTS, }

ONTARIO HORTICULTURAL ASSOCIATION

The Tenth Annual Convention of the Ontario Horticultural Association was held in the Railway Committee Room, Parliament Buildings, Toronto, on Wednesday and Thursday, November 10th and 11th, 1915, with the President, Mr. J. H. BENNETT, Barrie, in the Chair. Delegates were present from all points in Older Ontario and also from the north.

PRESIDENT'S ADDRESS.

J. H. BENNETT, BARRIE.

On behalf of the Ontario Horticultural Association, it affords me very great pleasure and gratification to welcome you all to this, our tenth convention of the Association, and I hope that the result of our deliberations and meeting together here will produce a most beneficial effect in promoting the advance of horticulture in the Province.

The warlike conditions prevailing in Europe during the last fifteen months, the details of which you are all conversant with, have of necessity made great calls on our energy and resources, more especially on the ladies of the community, whose unselfish efforts on behalf of the boys at the front cannot be overestimated; and, no doubt, have, to some extent, interfered with the usual pursuits of horticulture in the Province. When we compare the peaceful conditions prevailing here with those in Europe, we have much cause for thankfulness, but we cannot help admiring the courage of the peasantry, of whom we read, pursuing their regular calling of ploughing, sowing, cultivating, etc., close up to the firing lines, a condition of affairs that would not be very much appreciated by us here. The apprehension of last year that the war would seriously interfere with horticulture by limiting the supply of seeds, etc., coming to this country has not been fulfilled to any great extent, on the contrary, bulb growers in Holland and elsewhere have been so desirous of disposing of their stocks that much more favorable prices have been quoted, and horticulturists, generally, have reaped the benefit.

The report of the Superintendent will deal, as usual, with the standing and work done by the Societies in the Province, and while we may find that some Societies make great strides and then fall back, and others that have been rather lagging behind, suddenly make progress, it is only an indication of local conditions, the reason for which can be easily traced to the zeal, or lack of zeal, as displayed by those in charge of the affairs of the Societies. But, considering the condition of affairs, generally, we have good reason for congratulating ourselves on the progress horticulture is making in the Province.

The Executive have had under consideration many questions involving suggestions for improvement in various ways, such as improving the records and relations of the societies with this Association. One of the most important will be a scheme presented by the Treasurer with a view of recording, in a business-like way, the financial affairs of the Societies, and I speak for its consideration on your part.

TREASURER'S REPORT.

C. A. HESSON, ST. CATHARINES.

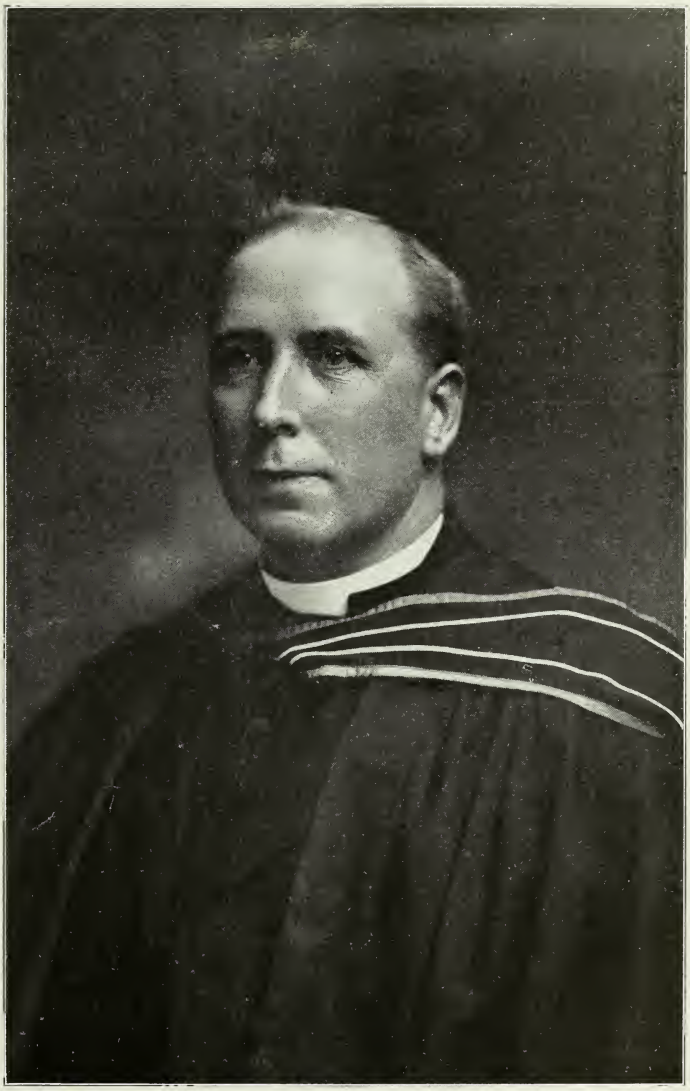
Last year we discussed a plan as to the payment of affiliation fees, and, no doubt, you have all heard something about it. We appointed a committee to take this matter up and deal with it, and we have endeavoured to do so, and I am glad to say that the matter in time will work out satisfactorily, so that every delegate to these meetings will come here with the full assurance that he is qualified to take part in all the transactions.

A circular letter was sent out in connection with this affiliation fee question, accompanied by a delegate's card. You should be aware of this fact through your local secretaries. In response to the circular letter—and I want to bear upon that point that it was a circular letter, that it was not a letter directed directly at the society which might receive a copy of it, but was meant to cover all conditions which prevailed amongst the societies, and if the society receiving it was in arrears, perhaps for the current year, I hope that they realized it was simply a circular letter. In response to that circular letter, I am glad to say that we have been able to accumulate $80 of the arrears. You will bear with me a little in this matter, because I have been studying it since the last Convention, and it is a matter of very great moment to all of us, because the whole thing to be solved is this, that these fees be paid regularly when the societies' delegates come here. I feel very much on this matter, and, therefore, I hope you will bear with me if I am a little lengthy on the subject. Some societies whose delegates come here were not aware of the fact that they were in arrears, and when this circular letter was received by some of them they were very much taken aback to be charged with arrears. I have gone over the records of payments made by the various Societies and arrears that were due from them, and in a great many cases I have had correspondence with secretaries of Societies and have submitted statements from the Cash Books, and I am glad to say that there are very few Societies with which I am not now in touch, and I hope the rest will come in, especially as there is a Resolution from the Board that all fees should be paid before the first of November of each year, to enable this to appear in the report, and you will understand that it is quite important that your Treasurer's report should contain all transactions covering receipts of monies. That is what we are after, so that I hope with your forebearance during the coming few months, we will have this matter fully covered, especially in view of the resolution which your Board is going to submit to you.

I had a record of eighty-six Societies according to the Department's report, I have tabulated here these societies alphabetically, with provision made for the dates of their organization the date of their affiliation, the membership as according to the last report—1914—the amount of fees paid for 1914-1915, both arrears and current—the delegates each Society is entitled to send and provision made for recording the number of delegates who attend. So that in accumulating this sort of information, we will have ultimately all the details in connection with the Societies and the Association to carry on from year to year.

The Treasurer then presented his financial statement as appears on page 6.

Moved by R. WHORLEY, seconded by W. B. BURGOYNE, that the report of the Treasurer be adopted. Carried.



Rev. G. W. Tebbs, Hamilton, President.

REPORT OF SUPERINTENDENT.

J. Lockie Wilson, Toronto.

It is doubtful if any of the present generation can call to mind a season when there was such a profusion of bloom on plants and such a wealth of dark green grass on lawns as has been evident in this year of grace 1915. We have experienced rain, which has almost, if not quite, rivalled the quantity of precipitation which falls in an average year over the British Isles, and with it has come to our gardens some, at least, of the beauty and extent of color which invariably surprises and delights the visitor to the old land.

Reports received from Societies indicate that, in most instances, they have had a successful year. It is true that the many calls on the citizens for contributions to the various Patriotic funds have, in a few cases, resulted in a decrease of paid-up members, but this falling off is very slight and is more than counterbalanced by increases shown in other Societies. As an instance, through the energetic work of their officials St. Thomas records a membership of upwards of 1,400. Nor has the good work suffered even when the roll has decreased, as the busy workers who were left redoubled their efforts and accomplished quite as much as had been done with a larger membership during the previous season.

During the financial year which closed on October 31st, seven new Societies were organized, viz., Cayuga, Chatham, Dundas, Essex, Milton, Port Credit and Richmond Hill. All of these are doing excellent work in their several towns and villages. Two Societies have discontinued operations, Caledonia and Paisley. There are now in good standing 79 with a membership of upwards of 14,000. Applications have already been received from citizens in half a dozen places in Ontario who wish to organize Horticultural Societies during the current year.

Owing to the strict economy now being practised by the Department not so many lecturers on horticulture as usual were sent to address meetings, but, as conditions become normal, it is hoped that the number may be increased in 1916.

During the year past the hand of death has removed from our midst three members who took a great interest in horticulture and who have been in attendance at our Conventions. The sudden death of Mr. E. T. Cook, within a short time after our last meeting, was followed more recently by that of Mr. J. Thos. Murphy and Mrs. Allen Baines. Mr. Murphy's kindly face was well known at our Conventions, until of late years increasing feebleness prevented his being present. Mrs. Allen Baines was one of Toronto's most energetic horticulturists, and when the vacant lot and school gardening work was being inaugurated, no one in this garden city did more to help it on, and thousands of plants were given by her to be utilized by the children of the city. The passing of Mrs. Allen Baines will leave a vacant place amongst our workers that it will be hard indeed to fill.

The vacant lot and school gardening propaganda inaugurated by our horticulturists is succeeding beyond all expectations, and the excellent work done in this city by Geo. Baldwin and Prof. H. L. Hutt is worthy of the emulation and support of all good citizens. Hundreds of vacant lots have been cultivated and city gardens greatly improved, and the children in "The Ward" are catching the spirit of horticulture, and in many a dingy home a flower or vine this summer has brought enjoyment to the lowly dwellers, whose surroundings have hitherto been seriously neglected.

Much credit is due in this connection to the Toronto Vacant Lot Cultivation Association, the Rotary Club, and the Dovercourt Land Company, all of which have done praiseworthy work.

While particularizing, I wish to congratulate the Fort William Horticultural Society, which is making rapid strides in all that goes to make a city beautiful. The work done by them in the encouragement of the cultivating of vacant lots stands boldly out as a shining example to our other Societies.

During the year your directors have been endeavoring to have all our Societies affiliate with the Central Association. It is difficult to understand how any Society in this Province, knowing of the good work that has been done for them by the Ontario Horticultural Association can fail to pay the trifling fee that is asked in order that the work might be extended. Expert lecturers have been secured, and their valuable addresses published in full. From a financial point of view every Society has been a gainer through the increased Legislative grants obtained through the earnest efforts of the Association.

In the past there has been some misunderstanding about the payment of affiliation fees, but this difficulty is being overcome through the excellent business capacity of our Treasurer, Mr. Hesson. The card system arranged for by him will prevent any possible confusion as to the payment of affiliation fees in the future.

As in previous years I am giving herewith a short résumé from the reports of those Societies which have taken the trouble to tell us of their work during the past year.

REPORTS OF HORTICULTURAL SOCIETIES.

AMHERSTBURG: Options given to members, flowers and shrubs supplied for beds in the park and all parts of the town, and these kept in order by the Society. The Town Council made a grant of $60.00 and the County Council $25.00 towards the work.

BARRIE: Membership slightly less. New feature taken up was a Sweet Pea Show, which was so successful that it will be repeated in 1916. A similar one for tulips and pæonies is also intended next year. The exhibits are placed in a large store window so as to be seen by all who pass. Other features of educational value are outlined for the near future. The annual exhibition was very successful, the attendance being larger than in 1914 and entries equal in quality to same.

BELLEVILLE: The work of this Society has been planting in the beds in the Queen Victoria and Corby Parks last fall of tulip bulbs, and this spring of plants. Distribution of seeds to the public school children in the spring. A flower show was held in the Queen Victoria School on September 29th, from seeds given to the children. Although late in the season the show was a good success, and the children of all the different classes took an enthusiastic part in it. The Society has succeeded in having all of the public school teachers take a personal interest in the Department of Horticulture. Flower beds in school grounds planted and plants, bulbs and a work on gardening given to members.

BERLIN: The usual outdoor competition was held and outside judges procured. The competition becomes keener each year, and the general appearance of the city shows the efforts of the Society to be beneficial. The children's garden work was continued and the interest taken by the teachers was shown in the improved work of the children. The Annual Exhibition held on August 25th and 26th was better than ever, and in all classes the exhibits were an improvement over those of the previous year. The children's classes were well filled with the product of the seed distributed by the Society, as well as those open to the various products of the gardens. The increase in the gate receipts was a sign that the general public are interested in the work and the Directors feel encouraged with the showing. Many

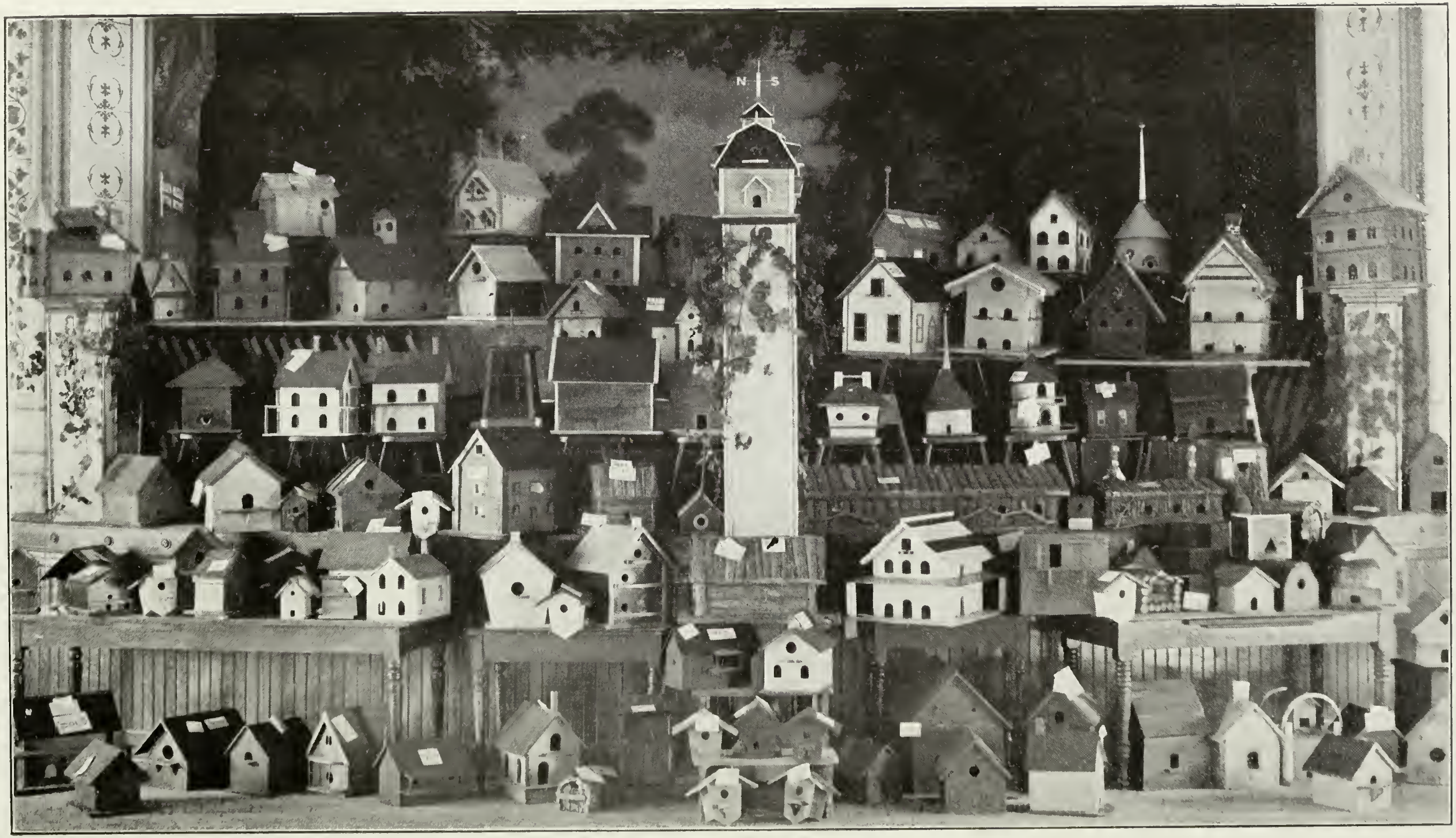


Photo., W. M. McNeely.

Bird Houses Exhibited by Members of the Carleton Place Horticultural Society.

of the factories are doing some planting around their premises as a result of the work of this Society, and the cemetery was much improved this year through the endeavors of the President, who has a seat in the Council.

CARLETON PLACE: During the past year the Carleton Place Horticultural Society has made very good progress, having 188 members as compared with 130 last year. Special attention has been paid to the school children and one of the most useful and interesting enterprises of the Society was the holding of a Blue-Bird Bazaar in March. The children made birdhouses, shelters, etc., suitable for the various kinds of birds and competitions were held in which every school child had a chance to take part. The girls competed in bread, cake and candy making, sewing, knitting, drawings of birds and flowers, etc., the premiums in every case being gladiolus bulbs. The net proceeds of the bazaar were $422.90, and a large bale of clothes for children, both of which were forwarded to the Belgian children as a gift from those of Carleton Place. As a result of the bazaar there are now about 150 birdhouses scattered throughout the town and the neighboring villages have also taken up the idea of bird protection.

During the summer a border, 85 feet long, was established at the public school, and it has been a continuous source of pleasure to the 700 children who all have a direct interest in it. The Society distributed 700 packets of flower and vegetable seeds among the school children and about 3,500 gladiolus bulbs of the highest quality.

On September 3rd the second annual exhibition was held, one of the best held in a town of similar size. The premiums were all in bulbs for fall planting, so that next spring the town should present a very beautiful appearance.

There were some twenty-two entries in the lawn and garden competition, and so successful was this feature of the work of the Society that next year it is hoped to grant a bigger appropriation for it. This lawn and garden competition has done very much to improve the general appearance of the town. On September 30th and October 1st, the members decorated the Town Hall for the Teachers' Convention and such a splendid exhibition of flowers was shown that the greatest praise was expressed by the visitors. The Secretary of the Society delivered an address before the convention on "Outdoors," and impressed on the various teachers the importance of school gardens and drew attention to the splendid work being done in neighboring towns.

CAYUGA: Each member received the *Horticulturist,* and the rest of the funds was devoted to Civic Improvement. Floral culture is growing in favor, due to the work of the Society. Another line of work undertaken is endeavoring to interest boys and girls in horticulture. This was accomplished by holding a fair at the public school. Seeds were distributed to children in the spring and were sown according to directions and the products exhibited. This feature will be enlarged next year. A campaign for cleaning up and beautifying the cemetery was also inaugurated, which has been very successful.

CHESTERVILLE: Membership has increased. Seeds, bulbs and plants given to members. Fifty young maple trees set out in the fair grounds, all of which are thriving.

CLINTON: The unusually wet season has prevented the members from getting the best results from their efforts, but, notwithstanding this, a most creditable display of flowers was made at the annual Flower Show held on August 31st and September 1st. The cut flowers were sold by auction for the benefit of the Women's Patriotic Society, realizing about $22. Great interest was taken in the Special Aster and Gladiolus contests which brought out some splendid collections.

The flower beds in connection with public buildings were maintained as usual. Membership increased. Premiums to members were the same as last year, namely, $1 worth of seeds, plants or bulbs in the spring and 50c. worth of bulbs or shrubs in the fall.

DRYDEN: This Society encouraged the beautifying of the town. $125 worth of flowers and trees, mostly trees, were sold for planting on lawns and a goodly number on the streets in front of property. Prizes were also given for lawns, flowers, and early vegetable gardens.

DUNDALK: Membership shows an increase. Two outstanding features of the work were co-operation in securing plants and bulbs for members at wholesale rates, and a flower show in August, at which competition was open to all. This furnishes an incentive to those living in the country, as well as the town, to grow flowers to a greater extent than at present.

DUNDAS: Membership about the same but interest in cultivation of flowers and gardens has largely increased. This is shown in beautifying the Park and other public places. The Council purchased bulbs and sold them to the members at cost price, and also to the Cemetery and Park Boards. Nine Societies in the town planted flower beds in the Park. In conjunction with the School Board and teachers, children were encouraged to take an interest in flowers. Third and fourth classes were given plants and seeds, and the teachers formed themselves into a floral club to assist. A flower show was held in the Park in September, which was very successful. The proceeds were given to the Patriotic Fund, and bulbs were given as prizes. Each member received the *Horticulturist* and several lectures were given.

DURHAM: Premiums were distributed in the spring, and plants and seeds to school children. Exhibition a great success. Prospects are excellent for next year.

ELMIRA: Gladiolus bulbs and aster seeds distributed to school children, and a special department arranged for them at the flower show. Flower beds were set out in the library grounds and the parks and a lecture given. Premiums were distributed among the members.

ESSEX: This is a new Society. Fifty dollars worth of shrubs distributed in the spring, and five thousand tulip bulbs for street planting as fall premiums. Several citizens contributed funds for flower beds on the streets, and the Society planted others. Interested the citizens in keeping lawns and boulevards and backyards clean and tidy. No damage done by children to flower beds except in one case.

FORT WILLIAM: The Horticultural Society this year endeavoured to interest all the different civic organizations in their work. Last fall, the City Council was induced to plough up a number of vacant lots and lot owners were asked, through the medium of the press, to forward to the committee a list of any vacant lots which could be used for gardening purposes. In some cases owners of suitable lots residing out of the city were communicated with and permission obtained to use same. The original scheme was considerably enlarged upon in the spring of this year owing to a number of unemployed desiring this means of raising vegetables for their own use. The object was to beautify the city by cultivating vacant lots, more especially those situated between or close to residential or business buildings. A committee of six, including the Mayor and City Clerk, was appointed to organize the scheme which was formed into a "Vacant Lot Gardening Association" and placed under the supervision of Mr. Paddington of the City Hall, who took a great interest in the work and to whom most of the credit is due for the success of the Association.

Photo. by W. T. Macoun.

Main Lawn, Central Experimental Farm, Ottawa.

Each member wishing to become a member was requested to fill in a card showing the number of the plot to be cultivated and upon which was printed the conditions of membership. The plots allocated to those members who were unable to pay for discing and harrowing were prepared at the City's expense. Each member was supplied with a bag of seed potatoes or the value of same when they harvested their crop. Each plot was staked out and numbered to correspond with the number on the membership card. Members were requested to plant at least one row of flowers in addition to vegetables. If required, the City provided fence posts and wire. The number of lots cultivated was 263. The scheme generally proved a success, but, owing to an exceptionally wet summer and early frosts in August, the potato crop was severely damaged.

The Park Board was induced to give prizes for garden competition, but not confined to the members of the Society. Six prizes out of the nine given were won by members. There were forty-two entries in this competition and one hundred dollars given in prizes. It was open to all amateurs with the proviso that all work must be done by the competitors. There were two classes (A) 25-foot lot or under, (B) for space over 25 feet. The prizes were given on the following basis:

25 points for best layout of space available.
25 " " neatness and cultivation.
25 " " neatness and layout of back yard.
25 " " best bloom and vegetables.

The Board of Education distributed to the school children 2,000 packages of seed including flowers and vegetables, offering prizes for the best garden to the pupils in the seven different schools. This was supplemented by prizes given by the Horticultural Society, the flowers to be shown at their annual exhibition. Of the four hundred children taking seeds, three hundred and five planted gardens, one hundred and eighty-three were fair, sixty-two were good, and sixty were in the prize winning class. One of the judges, before taking up this work, examined over five hundred school children's gardens in the rural districts and in his opinion the average country child took more interest in the work than the city child, but the prize winning gardens of the city compared very favorably with those of the country.

The Society held a bulb show on March 28th and 29th. There were fifty-six entries, and a lively interest was taken in this new departure. No charge was made and 831 people passed through the doors. The Fall Show was not as good this year as usual although the exhibits were of higher quality. Special prizes were given for small fruits to encourage their growth in this district.

GODERICH: Membership shows increase. Number of volumes in library 39, including Bailey's Cyclopædia on Horticulture. Each member receives the *Horticulturist.* Rose bushes will be purchased for the members next spring. Darwin tulips given last fall proved very satisfactory. Prizes given to school children for flowers and vegetables at the Fall Fair. The town is improving in appearance, largely due to the work of the Society.

GRIMSBY: Membership about the same. Premiums given to each were *Gysophila Paniculata,* and *Clematis Recta,* also the *Horticulturist.* Rose Show held on June 24th, with a fine exhibit, was a great success. Fall premiums are three Japanese Lily bulbs to each member.

GUELPH: During the year eight meetings of the Board have been held. Premiums given to members include plants, bulbs, small fruits, vegetable seeds, shrubs, implements, or certificates to the value of 50c., for horticultural requisites, to be purchased at any seed store, and also the *Horticulturist.* Over one thousand bulbs have been distributed to members, and about three hundred shrubs. Two Lawn and Flower Garden Competitions have been conducted as in other years, but the work has been extended in order to bring practically the whole of the City into the competition. Under this scheme, the districts of last year were grouped into one for one competition. Three prizes were given for the best kept lawn and flower garden, working people only. Prizes: First, $4; second, $3; third, $2. The second Lawn and Garden Competition took in all new districts, in which there was no competition last year. This provided for prizes in each of the six different wards of the City. There were three prizes for each, first $3; second, $2; third, $1, making a total of $36. A vegetable garden competition has also been conducted, covering the entire City and including over forty entries. In this competition six prizes were awarded, ranging from $3.50 down to $1. No entry fee was charged, and both members of the Society and non-members were admitted.

When a prize has been won by a non-member, the membership fee is deducted from the prize money, and that person is made a member. For members only, there was a window and verandah box competition open to the whole city membership, with four prizes ranging from $3 to $1. For the best Lawn and Flower Garden in the City, a diploma was awarded, provided the owner was a member, and had not won a diploma in previous years. For the best Vegetable Garden in the City a similar prize was awarded under the same conditions.

Vegetable and aster seeds, and gladiolus bulbs were distributed to the scholars in the senior grades of each school, to be grown at home by the pupils. It was the intention to hold a fall fair at the different schools, at which the children could exhibit the results of their gardening operations, but this idea had to be abandoned. The Society attended to the planting and arranging of window-boxes at the City Hall, Fire Hall, Post Office, and Public Library, all of which has helped to beautify the City and act as an object lesson for those who wish to follow this example around their homes.

When the pæonies, roses and iris were in bloom at the Ontario Agricultural College, the members of the Society and their friends were invited to an outdoor meeting on the College grounds. A large number attended, who were joined by members of the Berlin Association. The party was conducted through the greenhouses and the flower, vegetable and fruit grounds.

This year, owing to the growing necessity for economy in all expenses and the desire to do something to help in some way our national organizations, it was considered advisable that the Society co-operate with the Guelph Red Cross officers in conducting a flower show to aid in augmenting the funds of the Red Cross, as well as carrying out their idea of an annual flower show. The plants and flowers were arranged for and supplied by members of the Horticultural Society, and citizens generally, while the Red Cross members attended to the decoration of the hall and arranged a programme. The success of the evening exceeded all expectations, and over $150 was realized for Red Cross work.

Hamilton: Number of members 457; number of lectures, 4; the themes, "Bulbs," "Roses," "Plant Improvement" and "Making the Most of the Backyard Garden"; number of garden meetings, 5; these are undoubtedly the most popular, and not the least interesting and instructive phase of the season's work; number of journals taken, 109; the *Horticulturist* is not given to the members as previously, though members subscribe for it through the Society. In the children's department four of the smaller schools have received attention. Mr. W. T. Jarman, a member of the Board, who has specialized in this line for some years, gave 1,000 corms for the children, and a gladiolus show was held. the flowers being sold for the Red Cross funds. The awards were ferns and gardening books.

In upper Hamilton the children receive prizes for flowers (mixed varieties) grown from the plants donated by members of the Horticultural Society, being the surplus from the home gardens, and thus it was put to the good use of interesting juniors, whose parents were either unable to provide material to start the children gardening, or were too indifferent to take an interest in this work. The results have been very manifest, and well repay the efforts made, as well as demonstrate what can be done in this way with otherwise waste products.

The surplus from other gardens has already been promised, that work may be commenced in other centres, with the object of encouraging improved home surroundings; a thing to be greatly desired in some sections. There was co-operation with five Community Clubs, where, as information was the most imperative need, meetings were arranged and addresses given on the most elementary garden themes, and gardening handbooks were presented to the Clubs to be used as reference books by the members; about fifty were thus placed. Judges were supplied for three Community Clubs Garden Contests, and the prize lists supplemented by the awarding of certificates of merit—some thirty in all—and eight garden books. This included the workers in the Civic Vacant Lot Gardens who were specially recommended by the Superintendent, Mr. Wild of the Parks Board. (One man in his lot raised forty-two bushels of potatoes, though, as the lots were under water for a time, the Civic Vacant Lot Garden managers are somewhat disappointed over the returns.)

A Street Corner in Stratford.

In lieu of a Flower Show, a Garden Competition was arranged, which included all the in-town members' gardens, and eighty-seven awards were won by members (directors only barred). In all, 143 Certificates of Merit have been given for good work in various lines, and seventy-two garden books awarded as prizes.

The Herbaceous Border planted last autumn in Dundurn Park is to be extended this fall, as the Parks Board willingly granted the necessary permission. Spring premiums, the choice of gladioli or perennials. Fall—tulips or pæonies.

HANOVER: Started Civic Improvement work. Boxes made for front windows of Town Hall and Library, and filled with flowers; six flower beds made in the lawns, and man appointed to look after them. Large flower show held April 2nd and 3rd was a great success. School children competed for bulb growing. Rural schools were furnished bulbs, and a silver cup given to the winning one; this cup to be won for three successive years before becoming the property of a school. This was much appreciated by all the farmers around and brought many in to the exhibition. A large flower bed was also made in front of the new post office with cement across the whole front; this will be planted in spring and fall. Membership shows a gain.

KINGSTON: Membership increased seventy-nine. On September 15th and 16th, exhibition held in the Armouries which was a great success, with a splendid exhibit of fruit, vegetables, plants and flowers.

LONDON: Had a very successful year. Held two flower shows which were attended by several thousand people, also had a lecture. Membership reached 400. For spring premiums two dozen gladioli and a columbine were given, and for fall Japanese lilies; also the *Horticulturist.*

MARKDALE: Premiums in shrubs and house plants up to $1 given to members. A Lawn and Garden Competition was held both in town and country. On August 27th and 28th the Fourth Annual Flower Show was held in the Armouries. Prizes were offered for annuals, perennials, house plants, window boxes and hanging baskets.

Membership same as last year. Town Council gave a grant to help on the work.

MIDLAND: This society during the past year has distributed to its members plants, seeds, and bulbs to the value of $127, and prize money in value $30. The society supplied and planted a large bed of flowers in the grounds of the local hospital, and also one outside the Town Hall.

For the first time in its history, the society held this summer a flower show of its own. This was so successful that the suggestion has been made to include vegetables in next year's show. The exhibits of flowers by the school children were much better than usual from seeds supplied by the society.

MILTON: Membership, 105. Held a flower and fruit show on September 7th and 8th, and also Lawn Competition. Plants, shrubs, flowers, and fruit trees given to members. The general appearance of the town is much improved.

MITCHELL: Increase in membership. Besides keeping the flower beds at the Public Library and Post Office in order, the society distributed aster seeds to public school children. Over fifty of these competed, every one of whom received bulbs, and the first three money prizes as well. Interest in flowers has extended to homes in the country.

NEWCASTLE.—Slightly higher membership. One hundred trees planted on streets, plants around churches, public and high schools, and boxes in the windows of the Post Office. Prizes were offered for these latter, the judge being Miss Yates, who gave a very interesting address afterwards. Over one thousand bulbs distributed this fall.

OAKVILLE: Members had five options to choose from: First, the *Horticulturist;* second, three roses; third, one dozen salvias; fourth, six columbines; fifth, Boston fern. Plant distribution was very successful, all plants having a vigorous growth. Planted one bed 30 ft. long in Town Hall Square, four beds in George's Square, and two new ones in the same place with annuals and perennials. Contributed to the Children Flower Guild. Seeds and plants given to children for competition for best kept flower garden. Prizes were donated by citizens of the town.

ORANGEVILLE: Membership the same. Members had choice of premiums in seeds, trees, shrubs and plants, as well as bulbs, also extra orders were filled at 50 and 30 per cent. discount. Planted hard maple trees on the main street to the exhibition grounds. Annuals were set out in town beds, also herbaceous perennials. Had a successful illustrated lecture, also exhibition in September with a good attendance. Some of the exhibits were sold and proceeds, $25.00, given to the Red Cross Fund. It is intended to plant in the spring evergreens in waste places, and elm trees in low spots, also to raise bedding plants in their own greenhouses. Great assistance has been rendered the society by the district agricultural representative.

Photo., A C. Beasley, Hamilton.

Shaded Grass Walk.

OTTAWA: The Ottawa Society has a most successful year, not only in the work accomplished, but also in the number of persons enrolled, there being 615 members as against 525 last year.

During 1915 five general meetings and exhibitions were held by the Society, each of which was up to the standard of previous years, while the Rose Show was probably the best for many years from the standpoint of the number of entries and quality of exhibit.

The Garden Competition was continued. Prizes amounting to $211 being paid to winners in the " Front Garden, " Rear Garden," and " Window box " classes.

As in previous years, the Society distributed among its members seeds, plants and shrubs in the spring; bulbs and pæonies in the fall. Towards the end of July the directors, at their own expense, gave a Garden Party at the Experimental Farm, to which all members of the Society were invited. After a visit to the Flower Gardens, refreshments were served to the guests and a most profitable and enjoyable afternoon spent.

OWEN SOUND: Membership larger. Members given options. Prize awards larger than last year. School children received prizes for plants from seeds sold to them.

PARIS: On August 27th and 28th the Annual Flower Show was held, when $150.00 was given in prizes, with 438 entries, the gate receipts amounting to $53.50.

The Society made and planted nine large flower beds and planted groups of shrubs in six different parts of the town, including the schools and public parks. The boulevards in the vicinity of these beds were also kept mown, which added to their appearance.

A Lawn and Garden Competition was arranged for in the spring, which included all the working men of the town. No entries were necessary, but each home was visited and scored, and the three homes, in each of the six districts into which the town was divided, which scored the highest were given prizes: 1st, $3; 2nd, $2; 3rd, $1. This created a great deal of interest, and the gardens of many of the homes were excellent. An outside judge scored the lawns and gardens of all who were not eligible as working men; the prize for this is a certificate of merit, 17 of which were presented to the winners.

Flower seeds were purchased in the spring for the school children of classes above the second book. In all about 120 children took them, and, as each had the choice of three, 360 packages were put out. Special prizes were offered at the Horticultural Show for the product of these. As school was closed when the show was held a large number failed to exhibit, but there were about thirty entries in the children's classes.

PERTH: During the spring a large quantity of miscellaneous flowering shrubs, plants and bulbs were distributed to members. Co-operative spraying of fruit trees was undertaken with good results. The Society is considering the purchase of its own sprayer, having used that of the District Representative of the Department of Agriculture for the past two years.

PETERBOROUGH: Membership has been increased by one hundred over 1914, making a total of three hundred and fifty. During the year the Society made two distributions of plants, bulbs, etc. In the spring a choice of ten options was given, together with a year's subscription to the *Horticulturist,* or, in the event of the member not wishing the paper, two options might be selected. This fall was distributed the usual assortment of 6 hyacinths, 6 daffodils, and 6 narcissus, only first-sized, named varieties being used. While two annual distributions are more expensive to the Society, it is worth while, as the members are reminded of the Society from season to season, and the spring campaign commences about the time members are enjoying the hyacinth blooms.

During the year the Society cared for the two Central City Parks, granolithic curbing was continued and a fountain is being erected this fall, which will greatly add to the beauty of these places. Funds for this part of the work is covered by a grant from the City Council.

PICTON: Membership is not as large as last year owing to the war, as there is so much going on in the way of patriotic funds, Red Cross work, and other demands on the public. The Society distributed gladiolus bulbs and double hollyhock plants in the spring.

This fall the premiums consisted of eight hyacinth bulbs of assorted colors, and four narcissus. The bulbs recently received are unusually fine, and the members will derive much pleasure from the blooms these bulbs will display during the winter months.

Port Dover: Annual Exhibition held September 15th and 16th was very successful. Entries were 695. Each member received the *Horticulturist* and 50c. worth of nursery stock, or flower and garden seeds. Children were given $20.00 worth of flower seeds, and plants from these are exhibited at the show. Membership slightly increased.

Port Hope: Plants, shrubs, and hyacinth, tulip and daffodil bulbs given to members, also *Horticulturist.* The grounds at the hospital were looked after and plants set out.

Richmond Hill: Membership increased to 85. Several instructive addresses given and most successful exhibition held, with 250 entries. Improvement visible in the village as a result of the Society's work.

St. Catharines: Exhibitions were held in June and September. Both were well attended, and the number of entries was greater than last year. The school children made a great showing, much better than for several years, and their blooms were of a very fine quality.

This is the second year in which Lawn and Garden Competitions have been held. Greater interest was shown, and there were more than twice the entries, and the gardens showed greater care and attention.

St. Thomas: Membership has grown from 1,070 in 1914 to 1,400 in 1915, an increase of about 300 during the year.

Public street flower beds have increased from 100 to 157 in number, these are mostly from 15 to 25 feet in length and about 4 ft. in width.

The City Council has increased their cash grant from $100 to $150, and, in addition, this summer they gave to the Society 7,000 plants from the municipal greenhouse, which would have cost about $700 if purchased. They included cannas, geraniums, coleus, etc. This fall there were imported from Holland for street beds 23,000 tulip bulbs. Almost every bed will be of different variety with distinct color scheme for each street; 110,000 bulbs were imported for the members, covering almost every known variety of flowering bulbs. There are over 400 different varieties of tulips alone. Last spring 40,000 gladioli bulbs were imported, 30,000 of which were planted. A new idea was the planting of 2,100 gladioli bulbs in one of the parks. The blooms produced were disposed of in several ways, some being turned over to Red Cross workers, who sold them and kept 50 per cent. of the proceeds. Most, however, were sent to sick homes, hospitals, and churches for Sunday during the flowering season.

Three thousand roses and one thousand shrubs were distributied as options and sold at cost to members. Several hundred roses (mostly baby ramblers) and other shrubs were used in planting boulevard beds. These flowered almost continually during the summer, and as they do not require to be replaced they make ideal decorations.

On the main street, the Society has bought and filled with plants 25 large cement urns standing about 4 feet high. These are placed at corners and in front of buildings where it is impossible to have grass plots.

The Society has planted in Pinafore Parks 61 varieties of French and Persian lilacs, a bed of 50 double pæonies and 27 varieties of single pæonies, direct from Japan; 60 varieties of 12 each of Darwin tulips, iris, daffodils, lilies, etc. Citizens have donated shrubbery and rare trees.

Beautiful Borders.

Held two spring flower shows and a rose and gladioli and an aster show, four in all. The Library Board has installed a complete set of works on horticulture for the use of citizens, and many have taken advantage of this. It has been necessary to employ an expert gardener and several assistants all summer keeping beds and shrubbery in best possible condition. Several of our directors have visited the park systems in different cities of the United States, and the information gathered has been utilized as far as possible.

During last winter the Parks Committee gave the Society all the flowers from the Municipal greenhouse for distribution amongst the sick. In this way over 2,000 bouquets were distributed. With the thousands of flowers scattered all over the city in street beds not one was disturbed or picked by children or adults during the summer. Dogs have been stopped running at large, which also takes away one of the most destructive features of unprotected flower beds. A number of members joined in the excursion to Rochester Parks on May 24th last, and reported a very instructive time.

SANDWICH: Had a very successful year. Increase in membership from 169 to 312. Planted 114 elm trees and took care of Soper Park, which was greatly admired by every one who saw it. Prepared and planted 68 flower beds, an increase of 36 over 1914. Built cement curb around some of the beds. Planted tulips last fall in beds around public buildings, flower beds around the County Jail and Registry Office, also Post Office and Town Hall. Gave members shrubs, greenhouse plants and bulbs at an average cost of $1.50 each. Held a flower, fruit, and vegetable show for three days, afternoon and evening, free for all. Gave prizes in cash $43.75, and about $75 in goods donated by merchants of the town.

On the second day the two schools were closed, and children were invited to the show and special entertainment provided for them; also a lecture on Horticulture. A large silver cup was given the Society by Reeve McKee, and three more were promised for the 1916 Flower Show. After the show, flowers in good condition were taken to hospitals and sick people, and fruit and vegetables were taken to the Home of the Friendless at Windsor. Automobiles were furnished by the citizens to transport the stuff to these places. The Society also took charge of the fountain in front of the post office and made it very attractive.

SEAFORTH: During the year the Society planted flower beds around the Town Hall, and supplied bulbs for fall planting. Assisted with the beds at the post office, and held a most successful show in September.

STIRLING: The Stirling Horticultural Society this year voted $25 towards beautifying the site of the new public library, and $30 towards the improvement of the roads and walks in the Stirling public cemetery. Garden seeds, bulbs, and flowering plants were distributed to all the members. The Central Park was also kept in good repair and in cleanly condition, and was much patronized throughout the summer. The number of members is 68 as compared with 57 last year.

STRATHROY: Early in the year a lecture on "Civic Improvement and Horticulture in General" was given. Two thousand packages of seeds were distributed to school children, and a Flower Show for these children held in the school building, when two rooms were completely filled with asters, nasturtiums, and bouquets of various flowers. There were 1,000 entries. Have distributed to hospitals, cemetery, parks, etc., over $50 worth of flowers and bulbs.

STREETSVILLE: This Society has given to each member a collection of annuals, spring seeds, shrubs, and a collection of fall bulbs. In literature each member has received a copy of the *Horticulturist*.

This fall the Society has given money to a school fair, as prizes for care of plots and plants. Did not distribute the seeds to the pupils, each pupil procured his own, but the Society contributed towards the awards.

WALKERTON: Each member received the *Horticulturist*, and in the spring was given a premium of 40 cents, to be taken out in bulbs and plants at the greenhouse in town. On August 27th the Annual Flower Show was held, at which prizes were given for annuals, greenhouse and house plants, prizes to be taken out in bulbs or plants at the greenhouse. This fall premiums were distributed in bulbs to each member to the extent of 40c. There was expended $12.85 for window-boxes, hanging-baskets, and Boston ivy for Carnegie Library.

WALKERVILLE: Increase in membership from 273 to 363. The number of flower beds this year was also increased to 16 beautiful large ones in the parks and open spaces throughout the town. Although the weather was extremely wet and cool, Walkerville, both for public and private grounds, maintained its usual high standard. Every street and road within this municipality has a permanent pavement, as likewise most of the alleys. The grass between the curb and the side-walk, and the side-walk and the property line is kept cut and trimmed by the Town Council. The uniformity and the cleanliness of our streets, the neat and beautiful homes, together with the open spaces with flower beds, distributed throughout, give the town the appearance of one beautiful park. The Society has added impetus to the work in its premiums to members, and the planting of flower beds in open spaces. Over 20,000 tulips and other bulbs were set out, also hundreds of roses, lilies, clematis, pæonies, shrubs and perennials, cannas, salvias, coleus, and geraniums.

WESTBORO': The Westboro' Horticultural Society has closed a very successful year with a good increase of membership and increased interest in the work, especially in the Kitchen Garden and the Children's Sweet Pea Competitions.

In the former competitions a silver cup is given to the members exhibiting the best kitchen garden, the cup to be won three years before the winner can keep it. In the latter competition sweet pea seed is furnished to the children, and cash prizes of $3, $2 and $1 given to the winners.

The Society had a very interesting and instructive trip to the Experimental Farm during the pæony and rose season, and are much indebted to the Honorary Director, Mr. F. E. Buck, B.S.A., in charge of the ornamental gardening there, for his advice and assistance, not only during this visit, but throughout the year.

Westboro' Society gives promise of becoming a very important semi-rural society.

WESTON: Membership increased. Flower shows held in June, July and September, at which the exhibits surpassed those of previous years in quantity and quality. Six varieties of vegetable seeds were distributed to 45 school children, who volunteered to plant and care for them. The Society donated prizes for the best vegetables from these seeds, which were exhibited at the Annual Flower Show in September, and proved the leading attraction. Twenty-six children averaged four entries each. This line of work will be extended next year and the exhibits purchased so that each child may learn that its exhibit has a monetary value according to its quality, apart from the prizes given. Premiums were donated to each member.

WHITBY: Membership has increased from 75 to 110 for this year. This was done by canvassing a number of our citizens, as well as talking it up with the members who are interested in better home surroundings, and thus getting their support and co-operation. The work this year has chiefly been the supplying of seeds, plants, and bulbs and recognized hardy varieties of vegetables, flowers and shrubs. The society has given better satisfaction this year than at any other time in its history. During the first week in September a Fruit, Flower and Vegetable Show was held, emphasizing particularly the work of the children. Show of flowers and vegetables this year was the best ever held, and has proved a good advertisement for the Society. Two thousand five hundred bulbs have been distributed.

WINCHESTER: Planted trees along the streets and erected a beautiful fence around the Horticultural part of the school grounds. Many flowers set out in grounds of churches and schools, and a small park started in centre of town. Annual Flower Show was a decided success. Council and School Board each gave a grant of $25. This has been the most successful year in the society's history and its influence on the improvement of the town is clearly evidenced in the greater care given by citizens to the grounds and surroundings.

WINDSOR: Membership 537, which exceeds last year's total by 126. Spring and fall options were distributed to the members, and all were very much pleased with them. A great deal of new work has been undertaken and has been very successful. In the spring vacant lots for gardening purposes for the working poor were advertised for, and the people of our city responded very generously. Fifteen different families were furnished with seed and in this way helped to become self-supporting by their own efforts.

Then the Home and School Garden movement was another new step. The School Garden idea had to be abandoned, but 19,000 packages of seed at 1 cent each were sold, one each to the school children, and they had a number of Home Gardens. The products of these gardens, both flower and vegetables, were exhibited at the Windsor Fair and were very successful. As usual, flower beds were put in at the street intersections, but this year forty new beds were added, principally in the eastern section of the city, where they were badly needed. Besides these, two patriotic floral beds were put in at the post office, representing the Union Jack and the Fleur-de-Lis. The Home of the Friendless received a great deal of attention, and this year the grounds have looked better than they ever did before, planted with flowers and shrubbery. A new playground was opened for the children, which was certainly a step in the right direction. There were installed a giant stride, a playground slide, a set of baby hammocks, and sand bins. A great many parents have expressed their gratitude to our Society for this step. The City Council was asked for a grant to do this work but refused it. However, the Society did it on its own account, and when the aldermen saw what a great success it was they installed several more in the different parts of the city which are managed by the Park Board.

WOODSTOCK: Garden contest held with over forty gardens entered, also successful flower show at which over six hundred different varieties of gladioli were exhibited by Mr. Groff, of Simcoe. Membership 85.

BRANTFORD: Prizes amounting to $206 given for lawn, vegetable garden and window-box competitions. Distributed oven ten thousand bulbs and spent about $175 for rose bushes, shrubs, vines, etc. Nine meetings were held during the year, including two open ones. Our membership was somewhat smaller owing to hard times, Brantford being entirely an industrial centre was particularly hard hit, but things are much improved now and we hope for a much larger membership next year.

PORT CREDIT: Lectures were given on January 25th by Mr. W. R. Hill on "House Plants," with particular reference to the culture of geraniums; on Feby.

8th, by Mr. Grosch, on "The Management of Stock Birds," illustrated by live specimens; on Feby. 22nd, by Mr. Wm. Allan, Head Gardener for Sir Edmund Osler, on "The Care of Small Plots," illustrated by lantern slides, all in natural colors; on March 8th, by Mr. Stewart, of Ottawa, on "Breeds of Poultry" for laying stock; and by Mr. Hart on "The Marketing of Eggs"; on March 22nd, by Mr. S. C. Johnson, Vegetable Expert for the Department of Agriculture, on "Vegetables for the Home Garden"; on April 12th, by Mr. McIlray on "Annuals from Seed," and by Mr. H. Dean on "Hardy Herbaceous Perennials"; on April 26th by Professor Graham, of Guelph, on "The Hatching and Rearing of Chickens"; and on May 17th by Mr. A. W. Briggs on "Plans for the Village."

Ferns and Violets at Netherwood, Hamilton.

On July 8th the Society held a most successful first Rose Show and Vegetable Competition in conjunction with the Women's Institute. Honor Cards were the premium given.

The Society also held on September 6th, in conjunction with the Community Movement, an exhibition on the grounds of Mr. Hobberlin, which was a great success, a great display of flowers and vegetables being shown. Also the display of arts and crafts were a great success for the boys. The prizes consisted of medals, trophies and diplomas.

The Society held a Vegetable Competition, the seeds for which were supplied by the Society. All members of the Society were given an option on seeds, shrubs and plants as a premium in this competition. The membership of the Society is 83.

Stratford: Increased interest among the 500 members. "To beautify the city, begin with your own yard" was the slogan, and so generally was it acted upon by the citizens that the rough, unkempt yard is now the exception and ere long will be a thing of the past.

The 55 flower beds, planted and cared for during the summer, added much to the attractiveness of the streets, and will again be in evidence when spring arrives and the hyacinths and tulips now planted come into bloom.

Flower shows were held in the months of May, June, July, August and September, the exhibits consisting of hyacinths, tulips, narcissi, pæonies, iris, roses, sweet peas, gladioli, dahlias, asters, salpiglossis, and zinnias. First and second prizes were awarded in each class, and a marked increase in the number of exhibits and public interest is recorded.

The School Children's Home Gardens entered numbered 235, and of these 90 received first, 85 second, and 18 third prizes, leaving 42 below third class standard. Two School Children's Bulb, Flower and Vegetable Shows were held, one in April and the other in September. The combined exhibitors numbered 250 and the number of exhibits 700. Thirty-two prizes were awarded, and in addition three, four or five packets of seed were distributed among non-prize winners for exhibits of merit.

In the Lawn and Garden Competition for the grounds cared for by the owners prizes of $8, $5 and $2 were awarded, and for home grounds where a gardener was employed one prize, a medal, was given.

For the floral beautification of school grounds prizes of $8, $5 and $2 were awarded, and this new feature is already bearing fruit. Shrubs, plants and bulbs purchased during the year numbered 26,200, these being utilized in planting the 55 beds and distributed as prizes and premiums among members and school children.

Stratford Park System is in the hands of a commission, and this year $5,000 have been expended in the purchase of additional property and $6,500 spent on maintenance and improvements; $3,000 of the latter amount having been used in the purchase of plants and shrubs. Though quite independent, the Park Board and the Horticultural Society work in harmony and so obtain the best results at a minimum of cost.

Tillsonburg: Has had the best season in its history. The window shows, which have been very successful, showed steady improvement in the quality of the flowers grown. This year we had four of these shows, and gave ribbons in recognition of merit. The blooms were afterwards disposed of for the benefit of the Red Cross work.

Our Garden Competition was an improvement over last year. We had more entries, and the influence of the competition was seen in the upkeep of the neighboring lawns and gardens.

Our large show, held the latter part of August, showed fine results. More care is being taken in the quality of the stock grown and discrimination is evident in the selection of the kinds placed under cultivation.

New work was undertaken in planting some of our town plots. The Society interested the Town Council and other bodies in the improvement of the park and then seeding and planting was done by the Society and this is being continued, in that a large number of tulips will be planted immediately in the public beds. The children were given seeds to be planted in pots under inspection, the results of the new plan showing decided gain over the old way of simply giving seeds and no trace of them being kept.

Perhaps the outstanding work that has been done this year was the importation of a large number of bulbs for the members. The greatest demand was for tulips, and of these a very large shipment was made. Hyacinths, daffodils and iris were also ordered in large number. The great result of this method of helping the members will be that next spring, instead of having a competitive exhibition we will be able to have an educational exhibit, when many kinds of bloom never seen here before will be shown.

INFORMAL PLANTING OF THE HOME GROUNDS.

Miss Mary Yates, Port Credit.

The type of gardening, known as formal, requires suitable areas and special attention to make it a success. In fact, formal flower gardens as such should be in places apart, and not in the landscape at all. Given special treatment, they have great value of their own, but it should be recognized that they are an individual study, as indeed are all special types. The Italian garden, with its statuary, and costly symmetrical bedding out may be an interesting adjunct to large pleasure grounds; it certainly is not in its true place as the main planting of the small yard or the rural home. Delight is to be gained by making Italian gardens, or Japanese gardens, on paved gardens, or by gardening in walls, or by the arrangement of Dutch gardens, rockery borders, shrubbery, or maze of roses; or by making individual collections of irises, hardy asters, pæonies, etc., or by specializing in Bog gardens and Fern alleys. Not the least enjoyable interest may result from collections of native species, in suitable beauty spots.

But let these specialists' gardens bear the same relation to the whole that the library or music room does to the dwelling-place. Let them be planned for and approached with due reserve.

Garden Planting to Make a Picture.

The free, informal treatment of garden spaces cannot be too strongly recommended for home grounds.

Was it, do you think, to geometric designs in geraniums and coleus that Tennyson's immortal lover invited his sweetheart when he urged her to " Come Into the Garden, Maud?"

> " Come into the garden, Maud ?
> For the black bat night has flown.
> And the woodbine spices are wafted abroad,
> And the musk of the rose is blown."

Neither would it be, I fancy, to the rows of the specialists' collections, or to unsympathetic plantings of the dotted type, but rather to a place of quiet charm, filled perhaps with "the music of some bird-haunted English lawn" where the plantings made a picture.

Too many gardens are only semi-living, and are visited moreover by the spirit of unrest that marks the tending. No mistake, indeed, is more general than to believe that, because a person knows something of methods of propagation, or of botany, he is necessarily able to plan the whole picture that should express the individuality, the ideals and the fancies of the owner. Accumulation of knowledge is not the smallest guarantee of intelligence in art or philosophy, and does not, in fact, assist in its development. Gardens or pleasure grounds may be divided into two classes—those having an aim or ideal and those without one. The latter present too often, as Dean Bailey says, a spectacle for the birds to laugh at, and of which we are quite conscious but uncertain how to remedy the evil.

Those who would put ideals into their work should turn for inspiration to the wild, where the grace, the profusion and the charm are the despair of the garden-maker. Concentration is involved, to prevent failure. Drudgery, that "gray angel of success," is required, if we would become artists in the task of creation or of development. Nothing is easy that is worth while.

Every yard should form a picture with each feature contributing its part to one strong effect.

Use, whenever possible, the original native planting of trees and, allowing the freedom of nature to remain, design to suit these.

THE HOUSE, its style and position, play a very important part in determining the character and general design of gardens and small yards. It is folly to ignore this. The house is incomplete without a garden, and the garden without a house. The blending of the two together is an intellectual and emotional art. Scattering trees and bushes over the area defeats the fundamental purposes of the place, which is to accentuate the homelikeness of the home. All powers of the imagination should be brought into play to accomplish this.

In most home grounds, the deficiency is not in too little planting of trees and shrubs, but that planting is meaningless and has no part in the general design. The primary considerations in a good domain are the structural elements of the place, and should be designed first. The flanking and bordering masses are then planted. Finally, the flowers and accessories. All this means that the greatest artistic value lies in the effect of the mass, and not in the individual plant.

Plant fewer varieties and more of a kind.

In the plan maintain the open centre and mass upon the boundaries. Or plant in good groups, never scattering aimlessly. The more closely these groups can be made part of the general design, the better the effect will be.

"Some persons like painted stones, others iron bulldogs, in the front yard, and the word 'Welcome' worked into the doormat, and others like barbed trees. It would seem better taste to put such curiosities in the backyard, where the owner may admire them without molestation.

"The central idea is the residence, with a full, open green sward in front of it. Trees and bushes are massed into a framework to give effectiveness to the picture of home and comfort. This style of planting makes a landscape, even though the area be no longer than a parlour."—(L. H. Bailey).

This landscape at all seasons should present features of interest. These are gained by line effects, bold groupings of trees and shrubs, good vistas, etc., becoming thereby independent of mere colour.

THE LAWN.—No garden can approach perfection unless it has a beautiful lawn. To dot it over with flowerbeds, be they never so gay, or with trees, be they never so stately, is to leave it no longer a lawn, but a flower garden or shrubbery. When lawn, flower-beds and trees are wanted, let the lawn proper be made smaller and detached portions of it be given up to flower-beds and trees, or let them be placed upon its margin. This will be to the advantage of the flower-beds, trees, and lawn.

The easiest way to spoil a good lawn is to put a flower-bed in it. It should be free and generous. The more it is cut up and worried with trivial effects, the smaller and meaner it looks. Flowers, too, need a back-ground and border planting sets bounds to a place and makes it one's own. The places for flowers are along borders, against groups, by the corners of the residence, in front of the porches, using their colours, as an artist does his paints and palette, to give life and finish to the whole.

Hardy Asters and Boltonia. Photo. by Miss Yates.

THE WOOD LOT.—The pleasure grounds and general landscape should have some definite connection with the wood-lot. This may be had by masses of flowering shrubs, a thicket of free-growing roses, a plantation of hydrangeas, or the lawn can slope up gently by grass paths to a rock garden with dwarf shrubs and alpines.

THE PLAN.—It is most desirable to have a definite plan on paper and drawn to a scale, giving the location of the leading features, such as the house, wood-lot, outbuildings, service areas (clothes-yard, soils, manures, nursery bed, frames, etc.), vegetable garden, drives, walks, lawn, etc., to serve as a general guide for meditation, rearrangement and development of future plans.

It is most important to make this plan with a key having numbers to correspond with the list of plants used.

VIEW.—An important feature, not included in the plan, is the vista or view obtainable from the grounds. From one drive, a neighbour's orchard makes a glory, whether in bloom, in fruit, or when the bare branches form a delicate tracery against the sky. To take the best advantage of this, it was necessary to make a special type of fence.

In a garden overlooking a magnificent view of the Georgian Bay such restraint has been used in the planting that the eye is never violently dragged back to trivialities in the foreground, but appears to be conducted quietly to the scene beyond.

Andrew White's garden on the hillside was planted to be an inspiration to students passing to the Agricultural College at Cornell University.

METHODS OF PLANTING INFORMAL BORDERS.

To bring the planting into line with these schemes, some consideration as to methods is necessary.

A few years ago Mr. F. E. Buck, of the Central Experimental Farm, Ottawa, gave to this Convention an admirable plan for grouping the four flower periods. This can form the basis of informal plantings, and cannot be too strongly recommended as a working scheme by which to plan pictures for large or small gardens.

In May we have Dutch bulbs (such as tulips and narcissus, etc.) and shrubs and alpines, and such other flowers as primroses, forget-me-nots, dwarf iris, bleeding heart, rockets, anchusa, polemonium, etc.

In June and July there are the Ardent flowers, such as pæonies, irises, columbines, Canterbury bells, and such wood flowers as trilliums, spring anemones, lily-of-the-valley, Solomon's seal, etc.

In July and August we find the Showy flowers, such as perennial phlox, bocconia, delphiniums, platycodon, campanulas, eryngium, lobelia, syphilitica, echinops, Ritro, etc.

In September and October we enter upon the period of the Prevailing flowers, such as perennial sunflowers or helianthus, heleniums, pyrethrum uliginosum, hardy asters, boltonias, chrysanthemums and Fisher's aconite, etc.

Other varieties giving life and finish are campanulas, pyrethrums, gypsophila, thalictrum, fox-gloves, pinks, oriental poppies, etc.

Annuals may also be used to fill in. But roses should be planted in a bed by themselves.

In order to make sure of a right balance of bloom in the picture, it is an excellent habit to use coloured chalks on the plan, allotting a definite colour to each of these four groups, such as the green for the Dutch bulb, etc., section, yellow for the Ardent section, red for the showy section, and blue for the Prevailing section. A glance will then show where to plant for a certain seasonal effect.

Besides continuity of bloom, harmonious colour progression must not be lost sight of.

Miss Jekyll's scheme for long borders, say 200 to 350 feet, gives grey and glaucous, blue, yellow and white, orange, scarlet, orange, yellow and white, purple.

Amateur Gardening gives the following progression: Deep blue, light blue, pale yellow, white or cream, pink, rose, crimson, scarlet, orange, bright yellow, pale yellow, lilac, lavender, purple and violet.

For the actual planting itself, the same hard and fast rules cannot be laid down. But the same general principles apply. Get away from the straight line effect for informal planting and fill large spaces with one variety only, these spaces to be in relation to the length of the border. Any of the following systems may be used according to circumstances:—

1. Single specimens.
2. Groups for mass effects, of from three to five plants.
3. Drifts. That is, long narrow patches of each plant placed diagonally, say twelve rows with six plants in each. These drifts should be interlaced by filling three spaces near the edge of each with plants of the opposite sort. This is for borders of from 200 to 350 feet.
4. Colonies. Using from fifty to two hundred specimens of the same plant, as the yucca filamentosa on the turn of the drive at Biltmore, or the delphiniums at Haddon, seen across sunlit spaces of turf, with a background of evergreens.

In order to form these Gibson groups in an easy way, the following plan works well, before attempting more complicated systems. Divide an eight foot border lengthwise into strips of two feet at the front, three feet in the middle and three feet at the back. Of bamboo or laths make a diamond the sides of which are equal to the width of the border. Placing this on the border, fill each space so formed (whatever its size or shape) with plants of one sort, keeping the low growers in front, the mediums in the middle and the tall ones at the back. Variety in height will come of necessity from the shape of the sections. Colour these sections on the plan to correspond with the four periods, as suggested.

The ideal garden is one that our personalities can fill, and that is free from the disease of materialism. The first principle of the informal method of planting is to make something that shall depend for its effect, not upon display of garish design, but upon its adaptation to the spirit of those who walk in it, something the value of which no one can measure in dollars and cents, something that is one's own—one's home.

A hearty vote of thanks was tendered Miss Yates for her very instructive paper.

R. B. Whyte: I saw Miss Gertrude Jekyll's garden the last time I was in England. It was most interesting.

Miss Yates: Can you remember if in that very long border, about fourteen feet, against a wall, the Grey and Blue Glaucous planting was repeated about two-thirds of the way down?

R. B. Whyte: Yes. Miss Jekyll is one of the greatest authorities on color schemes, and her works should be read by everyone who wants to make a garden a thing of beauty. Most of us are hampered in this work by our houses interfering with the space. When you grow 180 kinds of peonies you must make the most of your ground. My garden arose out of my love of botany. I have not got a garden that comes up to the standard of Miss Yates', still we can all envy her such a garden. Last year I started a new garden, and its development is a great pleasure to me.

Prof. Macoun: One of my hobbies is perennial bordering and any spare time I have I devote to it. I have had a border about 150 feet long and 10 feet wide for the past 17 years, and I have been trying to get in that border, first of all continuity of bloom from early in the spring until late in the autumn, at the same time to make it an informal type of border, but I find that one of the great difficulties in our climate is that in the summer we very often have long periods of drought, and some things we depend on for the effect in bloom we do not get, sometimes they last only a short length of time and leave a blank border, so that my plan has been to get the nearest effect by a great many specimens of the same nature of plant, so that if one kind of plant should happen to fail there is usually another one continuing from one end of the border to the other giving that effect. For instance, in the spring, instead of having rich masses of tulips or narcissi, I am planting six bulbs in clumps, so that if you look down the border it is a mass of early tulips during the early tulip season, Darwin tulips in that season, narcissi in the narcissi season, then in the iris season you get the iris effect. I have so many clumps throughout the border, you get the same effect at the same time. The difficulty I find in our climate is if you have any one kind of plant that takes up a large area, if it fails you, you have a large area there without bloom, unless you have a very large border, 300, 400 or 500 feet long. That is quite a different matter, as the small vacancies do not show up, but in the small border the little vacancies do.

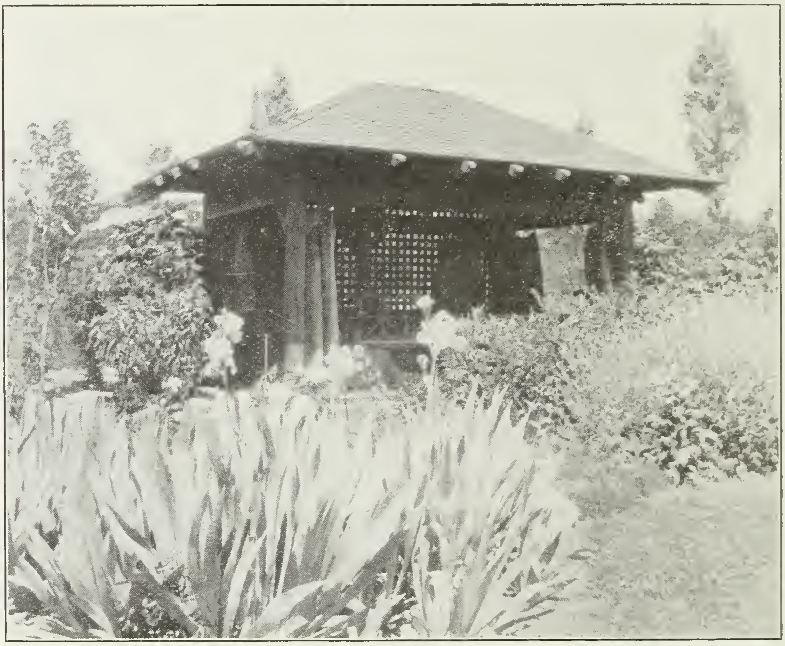


Photo by Miss Yates.
Iris Pallida Dalmatica; Double Gypsophila beyond.

There are a good many styles of border which may be made in this country, and I think it is good to get the experience of all those who are gardening, as we are all trying to get the same result—continuity of bloom, blending of colors. But there are different ways of doing it.

Prof. H. L. Hutt: I do not know any more valuable paper that has been given to the Society than the one we have just listened to. I find the majority of amateur gardeners, like our friend Mr. Whyte, start gardens through their love for plants. They start with a little collection, work on and after a while begin to find out that if they had only had their arrangement planned, how much more satisfactory their work would turn out. I believe the majority of gardeners want just the kind of suggestions Miss Yates has given. It has been my pleasure this summer to visit about 700 gardens in this city, and I found that was the one thing more than anything else lacking. We judged the gardens by a scale of points, so much for the arrangement, so much for the variety and for neatness and general order. But that point of planning and arrangement which she dealt with is where most of our amateur gardeners failed. In our work this year we took photographs of a lot of our best gardens and of the most beautiful features, I would have liked to have taken you to some of them. One young couple had worked out the most ideal garden. So many of the gardeners fall down by introducing the formal garden where it does not fit in at all. I hope some time again I may have an opportunity of showing you some of these gardens. We have taken photographs of sixty or seventy of the most beautiful ones in the city.

J. H. BENNETT: If there is one man in the community that ought to be removed, it is the man who always wants to be putting a bed of geraniums into some park or alongside the road. It is the same with horticulturists. In a great many books we are shown plans of color schemes and borders. I have tried to work it out, but I have found the difficulty when you go to lay out a border eight feet wide, you put in seven or eight plants of iris, three or four of peonies, three or four phlox, and in a year or two these have grown to such proportions as to hide everything else. Now if there is anyone who could suggest to amateurs any way not to have these plants grow so vigorously, that they crowd everything else out, I would be very pleased to have suggestions along those lines.

R. B. WHYTE: We can congratulate ourselves on the standing of our Association. We have not only upheld our own, but we have increased our membership. It now runs up to the large total of 14,000. I congratulate the treasurer on the scheme of sending out cards; that is the best way to draw attention to the fees. The Treasurer's report, however, shows that we have a balance on hand of $250. Now to what better use could we apply that money than in sending lecturers to the different societies? I was glad to hear from so many of the Societies' reports that they are nearly all doing something in the work of educating children. That is the most hopeful department of our horticultural work—the fact of getting these children to grow things in conjunction with other children to see what is the best one can do, is a stimulant to them. I had the pleasure last year of attending a school fair, and I never spent such a pleasant day in my life. The work done by the children in their first year was remarkable. One of the great points we have found in Ottawa, where there is the largest Children's Horticultural work in the world, is to give the children the seeds, but you also have to show them what to do with them. We have every spring a large demonstration in a garden, where the children are gathered together and they are shown what to do. That gets over one of the great difficulties that most societies have in getting good results. You will not only ensure results but you are giving a very valuable lesson to the children.

I would like to impress very strongly on all the delegates the necessity of co-operation with the district representative. These school fairs are held in nearly every Province. The County of Lanark was represented—there are twelve schools in the county. Each school competed against one another and the individuals competed one against the other. I would like to have been the judge there. The fine show of asters there was an eye opener as to the ability of children in this line. All their work is going on exactly in the line of our work. It is very valuable work and it is the work that we are trying to do ourselves, and being combined with the district representative in each county, we can do a great deal more than most of us can do individually. I was very much surprised at the uniformity of the show. It was conducted by Mr. Harding, District Representative at Perth.

T. D. DOCKRAY: I should like to make a short report about a few of the towns in my district.

BRAMPTON: The Secretary of the Brampton Society has had to retire this year. His business has accumulated so that he could not give the proper attention to the work. He writes that they have employed a new secretary. A great deal is expected from the secretary of these societies, and it may be a pointer to some of us to elect officers in our Societies who are not so burdened with business

Photo. by F. T. Shutt.

White Pine: One of the Most Beautiful Native Pines at the C. E. F., Ottawa.

cares that they cannot look after the affairs of the society. Brampton has set us an example in electing as secretary a man who is not so burdened.

WHITBY: The importance of work amongst the children is exemplified in Whitby. A year ago I went down to judge the children's exhibit. This year I went down again. I found that as a result of the work done the year before, the children had so many exhibits this year that the management was at their wits' end as to what to do with them. That shows what will happen if you give some little help and encouragement to children.

WESTON: At Weston this year a beginning was made of the Children's work, and a great many exhibits came in of all classes to the September Show. The children were given attention during the season, asked about the seeds that had been given to them—the President is around through the village a great deal, and speaks to them about it. I have warned Weston to look out for next year, as the children have done so well this year. I saw some of those boys at the exhibition looking at things, and taking notes.

PORT CREDIT: A new society was formed here last January. They felt that as there had not been a society there before they had to meet twice a week during the spring months to make up for lost time, and as you have heard from the report they have held all sorts of functions, and they have devoted the proceeds to Red Cross work, recruiting, etc., to such an extent that they have found, if the Horticultural Society takes hold of anything and helps it, it comes along all right.

RICHMOND HILL: Started last year but did not get formed in time to affiliate, it has affiliated now. They have had a splendid show this year, one of the features of their work being "Lawn and Garden Competition," and enough people went into that competition to keep the judges busy all afternoon. It was very close and had to be judged by points. That is a work that can be undertaken by a Horticultural Society in any village.

THORNHILL: Has not affiliated yet. It was formed last year too late to be affiliated with this Association, but they will join our organization next January and will be with us next year. All the same, they went ahead and had a Lawn competition for vegetables, perennials, vines, etc., also roadsides. Now this is the only society which has done anything to improve the roadsides opposite the frontages they have outside of a town. Generally these are littered with stones, cans, and articles of every description. In this Garden Competition there were prizes awarded for the condition of the roadside, and it was surprising how the people smoothed out the roadside and where you have a precipitous ditch, the people mowed that grass down a bit and it made it look a good deal better.

THE HIGH PARK SOCIETY has a big competition divided into classes, in lawns in the city and in the district in the west end. They gave prizes, so many marks each for front lawn, back lawn, perennials, annuals, shrubs, including roses, back fences, but not including vegetables. It has made a great difference in the whole neighborhood out there.

MRS. CADWELL: There are some things that were left out of our Windsor report—the report from Mrs. Grosvenor, the head of the school garden there, and also our meetings of which we have on an average one a month. Those things were left out. I also wanted to ask about the seeds. Where we could procure them cheap enough to give to the children. Another difficulty we had was in getting the School Board to allow us to have these seeds distributed. The Society did not think we would have any trouble in getting them through the schools so the envelopes were put in the schools for the children to fill in with their pennies, but we found that the schools would not allow the children to do so. The separate schools were very anxious that the Society should get this from the hands of the children, and the money was ready for us when we collected it, but in the other schools we had to meet that difficulty, and it was rather uphill work. We thought if we could not get them to them through the schools, we would distribute during the Easter holidays, but this did not work. Finally I had to see the School Board and after a great deal of trouble succeeded in getting the seeds through the school. If anyone could tell me how this work along those lines is done elsewhere I would be very glad.

Then there was a very unsatisfactory vacant lot in our city, through which we all went to go to market, as it had a path through it. We went to the priest and found we could get it by cleaning it up. We had it plowed, rolled and seeded, and we put in some playground apparatus for the children, as it was a very large corner, and they had nothing of that sort there. And that was brought up at one of our meetings as not being under the heading of Horticulture. It was certainly beneficial because the council who had been opposed to it before we took up the work laid aside $700, and also gave me a grant of $100 to do with as I considered best and help on that work, and I spent about $100 on that corner, and as it was next to the city hall, it was a wonderful improvement.

C. A. HESSON: We had been distributing for some years back to the school children, at first with no charge made, and ultimately the charge was one cent per package. We found the latter to be the best course to follow. We purchased one pound each of asters of three colors, and our lady members put them in packets. We had the directions printed on special envelopes for the purpose, and they gathered various evenings and out of this amount we distributed 2,856 packets to the school children last year. As the result of this distribution we obtained an exhibit amounting to 366 from these seeds.

J. LOCKIE WILSON: I believe you can get the seeds from the Agricultural College, Guelph. In regard to the School Board, I don't think they were up-to-date. Trustees are expected to use common sense in these matters.

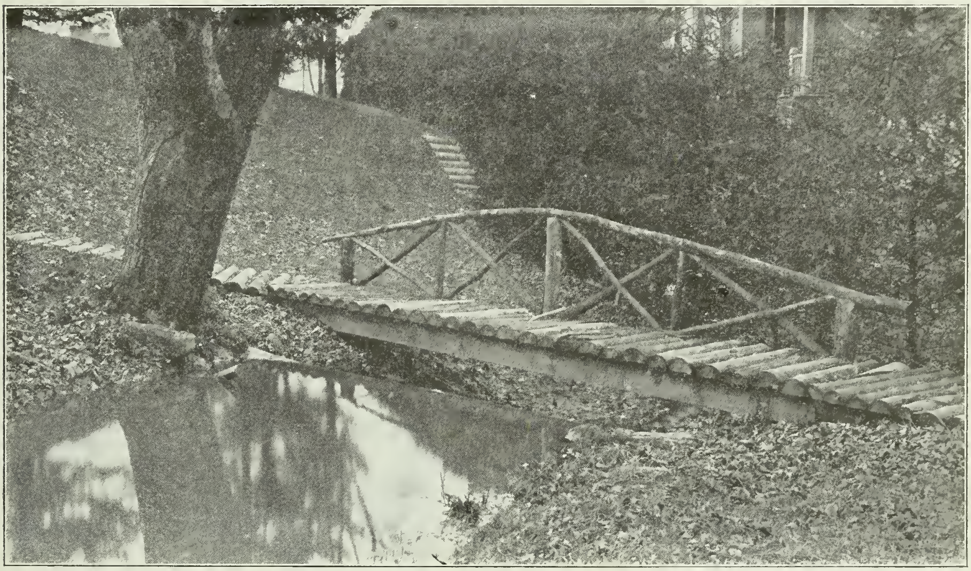
MRS. CADWELL: One gentleman informed me I was the first woman who has ever met the Board who has got anything through.

A MEMBER: We are governed by the Ontario School Act. We are not supposed to let lady canvassers come to the schools—either book agents or anyone else selling anything for money. Consequently, Mrs. Cadwell will have to do the same as the Walkerville ladies did some years ago—that is buy their seed by the pound and get a thimble and give out gratis these small quantities.

DR. F. E. BENNETT: I see some of you are doing a lot of good work around the post offices. Now, though I am not a Conservative, yet I acknowledge the Government is doing a good work, and if you will correspond with the head of the Department of Public Works, Ottawa, I know you will be furnished with money to do this work. Sandwich, I believe, got $35.

W. E. GIGNAC: Our closest neighbors are Windsor, and Mrs. Cadwell deserves a lot of credit in regard to the playground. I understand that at the annual meeting the question was brought up by a certain element they have in Windsor. Mrs. Cadwell did good work in the Horticultural Society. The corner which she mentioned was certainly an eye-sore. They now have a nice looking corner there, with swings and amusements for the children, and went so far as to have the corner fenced in, and a pile of sand for the smaller children to play in. Mrs.

Cadwell deserves more credit for that work alone than anything the Society ever did that she is connected with. Of course I do not know whether it is legal to do it or not. The City of Windsor donated $100 towards it. Now, in regard to Dr. Bennett stating that Sandwich got $35 from the Government. We undertook to fix up the fountain donated to Sandwich. That fountain had stood in front of the post office for a good many years and no one seemed to take much interest in it. I communicated with the Council, also it was on the Government's property and I communicated with them as well, and they gave me permission to go ahead with it. We tore up the cement around it and fixed it up and it is certainly a credit to the town now. I told the Members of Parliament "You should not expect us to pay for this work," and I did not hear anything more from them until I received a cheque for $35 from the Government. So that the thing which Mr. Bennett brought up, that if anyone is doing any work around post offices, the Government will be only too glad to give a small donation, is quite correct.



Rustic Bridge on Grounds of W. A. Child, Hamilton.

J. LOCKIE WILSON: Mrs. Cadwell was perfectly within the law and I hope that all the societies in this Province will, where possible, take up any undesirable lot where permission is given by the owner and improve it if the directors so desire.

REV. A. H. SCOTT: There are four things about our gathering to-day, and these come out of the reports that have been given, that are especially cheering to me, and if cheering to one, they may be cheering and encouraging to all the rest of us. The first is this: That there is about the gathering to-day a cheery, hearty encouraging tone that is hopeful of good. When I think of the membership of our Societies in the Province being 14,000 to-day that I trust will be increased to 20,000 next year.

The second thing comes in connection with the possibilities that belong to little centres in our Province, who perhaps felt themselves without these possibilities a year or two ago. A year or two ago Carleton Place had a few of its present members belonging to the membership of the Society to which I belonged in Perth. A little afterwards they formed the nucleus of a society of their own, and to-day they have a society that has almost as many members as we have in Perth.

The third thing that is encouraging is the interest that is being taken this year in what is called the "Vacant Lot Propaganda." We have in Canada and in the Province of Ontario which is said to be the banner province of Canada, a great deal of unoccupied territory, and the more we encourage people in our towns and cities in the utilizing of these places, the more credit to us and the more credit to the influence we exert.

When you think of this last thing, which is to my mind the greatest and the grandest thing of all—we stand here, representatives of an interest that is the oldest in the records of the race. The Divine approval was first shown to persons who were interested in the garden and when we take hold of our work, endeavoring to do it with the Divine approval upon it, I think we will rise to be more dignified, more influential, more useful in the example we set and more helpful to our brethren, as the man who wrote the lines:

> "Oh, bless the man to whom is given the instinct,
> That can tell that God is on the field,
> When He is most invisible."

Prof. Crow: The bird house suggestion has been enthusiastically received by quite a number. I have been doing some work along that line, and for the benefit of those who are contemplating it, it is an easy matter to spend a lot of time and money to no avail. I am also in touch with some good literature by authorities on the subject, and if I can be of any assistance in putting you in touch with literature concerning plans for construction of bird houses, I shall be very glad to do so.

There is a class of plant material mentioned a couple of times in the different reports—I refer to vines especially on our public buildings. Boston ivy is one of the finest plants for a brick or stone building. In the northern districts you can get Virginia creeper which will cling fairly well to brick and stone. I would like to register a strong plea that they use vines of one kind or another to very great advantage on public buildings.

A. McMillan: In Haileybury we are only five miles from the Province of Quebec. What we would like to know is, are we allowed to take people from Quebec as members?

J. Lockie Wilson: Yes.

A. McMillan: Some of our members that had farms thought it was not right for us to compete with them, but I contended it would be all right and if they can bring better goods than we can, it will serve to make us beat them.

BEAUTIFICATION OF COUNTRY HOMES AND RURAL IMPROVEMENT.

R. A. Penhale, St. Thomas.

As President of the Elgin County Board of Trade, I tried to encourage the beautification of the rural highways in our own county, but the amount of success we have obtained so far is not as gratifying to me as I would like; and, for that reason, I would like to appeal to the different city organizations who are lending a hand in extending their organizations out to their various rural municipalities.

The subject of rural beautification will not perhaps strike you as forcibly as it does us who live in the country. After doing so grand a work in the beautifying of town lots and everything round about the town and city, we want to extend this to the roadside, in fact to everything pertaining to the home of those engaged in agricultural pursuits, beautifying their homes as well. But this beautifying of the agricultural and rural districts must take on a different aspect entirely from what it will in the urban centres. We must have an eye to the labor part of it, and everything that entails labor must be reduced to a minimum. We had a splendid essay here this morning with regard to beautifying our home surroundings. A portion of the people could probably follow that out splendidly, but for the great masses we have got to have something not so elaborate, something that takes less time. Now we are about to enter a propaganda of good road construction, our Government is about to launch out in building roads throughout the Province, and it seems to me this is a splendid time for us to appeal to road builders and to bear upon engineers who are laying out those roads. Now these roads are to be built at a large expense, but at a small expense really in the long run if they would only see fit to do so. We should leave level boulevards along our roads. I am not advocating putting flower beds along public highways, and if at the present time we can get a nice boulevard kept in fairly good condition, so that it takes a minimum amount of labor, that is what we want for our country roads. The last two or three years some of us have been levelling the roadsides, and using the mower machine to keep the road fairly clean. This keeps the weeds from growing, and after mowing a couple of seasons, they fail to appear there, and I think it is worth all it costs for that simple thing alone. We can keep the roadsides fairly well mown—it only takes about three or four times during a season to keep the roadsides in a fairly good condition, and that will not take over an hour and a half or two hours with a team and a mowing machine, on the average 50 rod front farm of 100 acres of land. Now that is the reason why I advocate a boulevard without putting flower beds on country roads, because it can be done with a minimum amount of labor.

It has some other points, too—in many places along the highways we find weeds growing, probably a foot or two high. Where, therefore, these boulevards are not level, and you venture to drive up to the side with your automobile, there is a sudden drop, with the result that your machine will turn over. From that point of view alone the mowing of the roadside is desirable.

If we took the matter up with the Department when they start out on their "Good Road Propaganda," I think their engineers would lay the roads out in such a way as to be easily taken care of, and also encourage owners in planting trees. While there are some trees planted by the farmers, there is not nearly as much done in this line as there should be.

I see on the list here that I was supposed to say something about the beautification of the rural home—I did not understand that when I was called to speak, but I want to say just one word along that line. The lawn surrounding the home should be laid out naturally, with an eye to the economy of labor. Trees or shrubs or anything ornamental should be kept to the side with a large centre, so that you can easily keep the grass short by something different than hand-power.

There is another thing that we should endeavor to do, and perhaps the Horticultural Societies of the Provinces in the urban centres could help there.

We find our roadsides on the border of your cities and towns the receptacle of almost every kind of waste and refuse—tin cans and that sort of thing; and, generally, the road is bad at the edge of the city and town. Now that could be prevented by some means. It does not beautify the road to have a lot of cans and rubbish all along the side of it, and there should be something done to prevent the dumping of that kind of thing there.

A Delegate: What do you consider the best trees for roadside planting?

R. A. Penhale: Speaking in a general way, I would say the soft maple. There are trees perhaps more ornamental, but when you bring it to a practical basis and for a tree to take care of itself, there is nothing so good as the maple.

A Delegate: What provision would you make for drainage if you levelled the sides of the road up?

R. A. Penhale: It is very seldom necessary to have for drainage purposes an abrupt slope along the sides of the road, and very seldom more than you could drive across the ditch in perfect safety. Of course there are some places where you can't avoid that, but generally speaking the drainage is ample along our roadsides with very little slope, and in these days of automobile traffic, it is advisable to have the roads so that in cases of necessity you can go over the turnpike.

I hope you will make an endeavor to carry out this work which you are carrying on in the city into the country, keeping our rural municipalities in as presentable a condition as possible. I believe legislation has lately been enacted that people in the city and towns should contribute in carrying on the road work so many miles out beyond their border, and I hope you will see fit to carry out the work of beautifying the rural roads the same way.

GARDEN ROSES.

Percival H. Mitchell, Toronto.

So much has been written about roses as to the soil, the planting and their care as applicable to our local requirements that I wish to deal most particularly here with the selection of the roses for the garden, for from the bewildering hundreds of varieties of roses which are to be had to-day it is extremely hard to choose by the mere descriptions given in the catalogues, for accurate as these may be, they are quite apt to describe the more virtuous attributes of each and leave the grower to discover their other traits of character.

There are not merely hundreds of varieties of roses but thousands, and, gleaning from this multitude, the rose growers of England and Ireland list in their catalogues some 750 varieties each, and yearly about fifty new creations make their debut with the greatest of hopes of their originator behind them and these great hopes are liberally interwoven into the glowing descriptions of their charms: and, alas, at the same time many retire into oblivion after a brief stay when time has proven that beautiful as every rose may be there are others much more entitled to be included in the list of worthies.

All rose gardens have a beginning and the realization of first hopes instills that enthusiasm which is the great essential of the future. The proper roses must be secured to start with. There were two determining influences in the selection of my own first roses, my rose-growing neighbor who advised the planting of Richmond and the local nurseryman who made the statement that Hybrid Perpetuals only should be attempted by the amateur for outside planting as Teas and Hybrid Teas were too delicate for this climate. To Richmond, once my most beloved rose, do I tender my thanks for an enthusiasm which can never possibly be quenched.

Richmond bloomed that first year many many times with no apparent exhaustion, and I well remember after an absence from the garden of several days how I found a most perfect scarlet bloom, in the waning days of November, encased in a sheathing of ice. The lack of bloom on my Hybrid Perpetuals that first year was a disappointment, and that winter when the first real rose list was evolved the blooming quality of the Hybrid Teas were predominant in my selection. I am afraid that had I gained my first impressions of rose gardening with the Hybrid Perpetuals I had bought I would have agreed with the prevailing general opinion that the rose garden was quite beyond the ordinary amateur gardener.

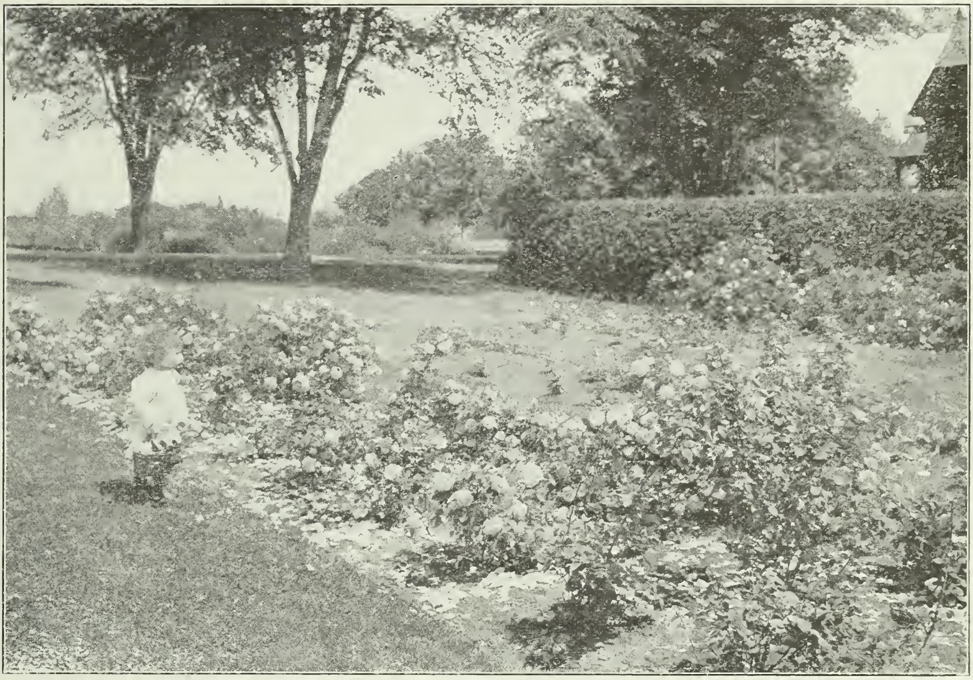


Photo. by F. T. Shutt.

Rose Garden, Central Experimental Farm, Ottawa.

However, by the continual harassing of my rose growing acquaintances, by delving into many rose books written by authoritative authors, and by constantly poring over some English gardening magazines (I was generally considered a nuisance at this period as the books appeared everywhere in the house) I eventually compiled a further list including about a hundred varieties which were almost from universal opinion considered to be the best for garden growing. From my association with these during the last few seasons I can say that their suitability for English gardens is quite duplicated for Ontario, and further that in several cases the roses have done better here than they are expected to do even in England.

I wish to emphasize that, practically, every garden rose can be grown in Ontario, and with but a reasonable protection in winter. The cold of winter does not seem to be a harmful element; to my mind it is the thawing and freezing that works the harm so that it is, possibly, because of our steady winter weather that rose growing in Ontario is so much more successful than further to the south of us. The protection usually given in winter to roses, by hilling up, is more to keep the rose from thawing until real spring arrives than to keep the rose from freezing.

There are three large classes of roses: Teas, Hybrid Teas and Hybrid Perpetuals. The lines between these families are not so distinctly drawn as formerly, as the hybridizing has been productive of many roses having the characteristics of all the classes. Tea roses are very straight descendents of *Rosa indica,* a native of China, and from this source it derives its delicacy of form and fragrance as also its delicacy of constitution. Most of the Tea Roses can be readily grown here, the great advances in Hybrid Teas, however, have seen the development of many which readily duplicate most of the characteristics of the Teas but include a vigor which the Tea Rose lacks. Even in England the Tea Rose demands the greatest attention in cultivation and protection.

The great modern class of Roses is formed of the Hybrid Teas. The Hybrid Perpetual was the forerunner in popularity, and the rather meagre second blooming of this class, quite sufficient in its day of only June blooming roses to justify its title of "Perpetual," was a great boon to the rosarian. The Hybrid Perpetual and the Hybrid Tea are very closely related. The Hybrid Perpetual was derived from the crossing of the Tea Rose ancestors and *Rosa gallica,* which is the parent of the Cabbage Rose of our grandparents' day and the Mosses and Damask Roses and is the element which has produced the showiness of the Hybrid Perpetual. The Hybrid Teas in turn have been produced by the crossing of the Teas and Hybrid Perpetuals and from these sources have acquired their delicacy, colors, fragrance, hardiness and a remarkable blooming quality. In 1867, when La France, the first Hybrid Tea, was evolved one can imagine the great joy of the rosarian in his proud possession of a rose that never seems to tire of blooming from early summer until winter sets in.

A new class of roses has been appearing in the last few years which has great promise. This has been evolved from the crossing of the Persian Yellow briar rose with various hybrids. Soleil d'or was the first of these and many of the later varieties have Soleil d'or as a parent. It has been quite fitting that the originator, Monsieur Pernet-Ducher, of Lyons, France, should be honored by a class being named Pernetiana. Many of the Pernetiana roses are the most popular to-day on account of the wonderful yellow and shaded colors which predominate.

The Rugosa roses and their hybrids are of Japanese origin, the Rugosa being a common wild rose of the East. The great bold growth obtainable and the extreme hardiness as a class make them most valuable.

The Moss Rose finds many friends and deserves a place in every garden.

The Dwarf Polyantha Roses which are commonly known here as Baby Ramblers, have many delightful varieties and as several keep continuously in bloom for many months these will appeal to all. The flowers in the Polyantha or Multiflora classes are small but in large clusters and the bushes are completely clothed in bloom.

Climbers, pillar roses and roses which will form large bushes are derived from many classes. Multifloras and Wichurianas comprise a large number while the several classes just described contribute to a great extent. The Wichurianas are developed from a Japanese wild rose of creeping habits. The Multifloras are quite similar.

The Penzance Briars are a charming class of rose, being a development of the English Sweet Briar. Lord Penzance introduced a large number of these most of which bear the names of Sir Walter Scott's heroines. They are of a bushy or climbing nature and perfume the air with the fragrance of their leaves.

The Noisettes are in general not very hardy but as they are excellent climbers they can be trained on walls and thus given the necessary protection.

I will conclude with the Bourbon class representative of which on the list is a great favorite of mine—Zephyrine Drouhin, the old "Thornless Rose."

The qualities which are essential to a good garden rose may be readily stated; this order of merit, however, being of personal preference. For myself, I would choose form as the first requirement; second would be color; third, certainty of bloom; fourth, hardiness and vigor; fifth, fragrance; and sixth, freedom from inherent diseases.

The form of a rose varies greatly from the massive flattish blooms generally found in Hybrid Perpetuals, through the globular shapes to the more or less pointed blooms. They all have their charms, although, personally, I do not take kindly to the globular shapes such as the rose Caroline Testout possesses. In fact, in the list to follow, the shape is my main reason for disqualifying Caroline Testout from among the first choice in the colour, pink.

Rose colors are marvellous, and very often are quite as gorgeous as painted by the raisers. Let me quote the color description of Irish Fireflame, a recent development in the single roses: "In the spiral bud state it is deep maddery orange, splashed with crimson, which as the bud develops becomes fiery orange-crimson, changing to solid delicate orange which becomes as the flower fully opens, rich, satiny, ochrey-old-gold delicately sheened veinated, crimson and pure lemonzone. Its gorgeous superimposing intense colour gradations spontaneously convey the idea of a flame. The handsome, graceful wood is shiny purple chocolate, and is festooned with varnished, deep, bronzy, green, ovate foliage."

This is rather conjuring with the spectrum, but the delicacy of the shadings of many of the newer roses is really beyond description.

The majority of the newer roses are quite capable of producing four or five sets of blooms within a period lasting from June until November. While quite a number of the Hybrid Perpetuals have really a good second blooming period the majority make a wonderful display in June and are extremely shy during the balance of the season. So far there are but few climbing roses which flower more than once during the summer. Several of the roses with most pleasing form and color are deficient in vigor, and the bush hardly aspires beyond the straggling stage; two indispensable roses, Madame Ravary and Arthur Goodwin, are of this nature, the balance of the roses, however, which I list have good growth in the plant.

One cannot think of roses without associating fragrance. It is unfortunate that quite a number of our best roses are deficient, and the best white rose Frau Karl Druschki is absolutely lacking in perfume. The many other representatives of the Hybrid Perpetuals however, quite make up for this; but it is one of the greatest aims of the hybridizers to produce a fragrant Frau Karl Druschki. The Hybrid Teas are, in general, fragrant; but after several years, when fragrance was not one of the aims in the hybridizing, the demand has come that the modern rose shall be fragrant, and it is notable that several of the best perfumed roses have been among the most recent productions. The Teas as a class have a delicate odor, and while they are described as Tea-scented the fragrance is of widely varied character. One of the sweetest scented roses is Conrad Meyer, one of the Hybrid Rugosa Roses.

The greatest ills we have to contend with here in roses are mildew and black spot. Many roses are specially subject to mildew, and the naturally vigorous rose is not immune, for Frau Karl Druschki and Conrad Meyer, two of the strongest roses, are quite addicted. Black spot seems to have been imported to us, and is particularly noticeable on the Pernatiana Roses. Thus some of our strongest and finest roses are peculiarly susceptible to such diseases, and we must accept such roses and combat their ills as they occur.

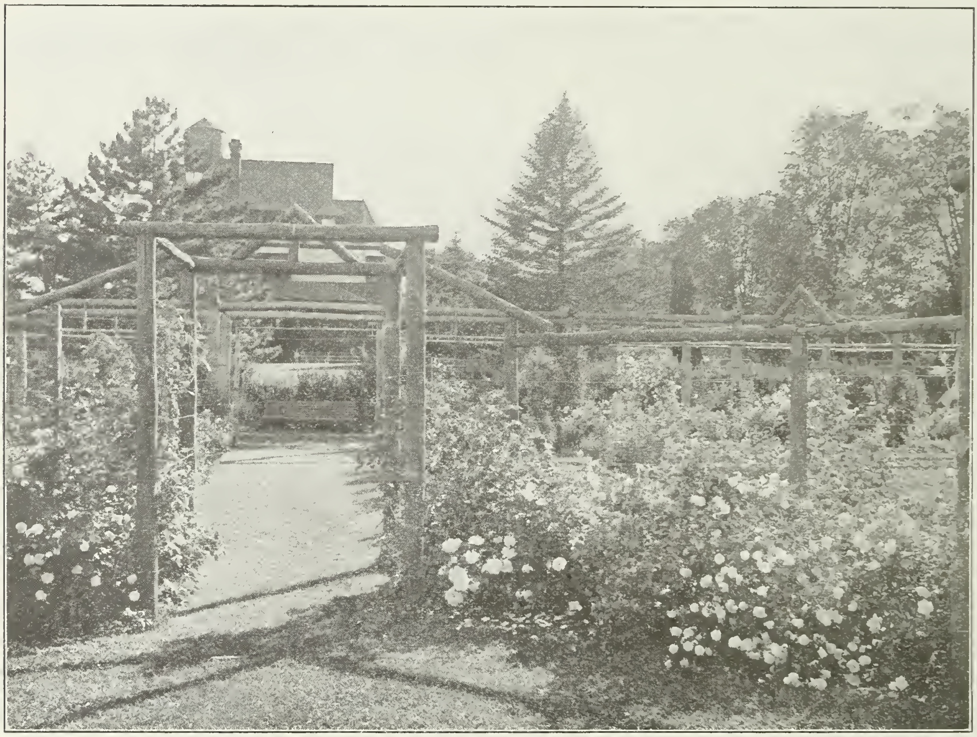


Photo. by F. T. Shutt.
Hardy Hybrid Japanese or Rugosa Roses and Hybrid Perpetuals in the Rose Gardens, C. E. F., Ottawa.

The development of new roses is now followed along quite scientific lines. In England and Ireland, especially in Ireland, the production of novelties reaches large numbers yearly. The catalogues of such noted Irish raisers as Alex. Dickson & Sons, Hugh Dickson, and McGredy Sons, all in the neighborhood of Belfast, continually show wonderful new roses. The raisers in England such as Paul, Cant, Merryweather & Sons, and the noted amateur Rev. J. H. Pemberton also produce many, but the most striking are of Irish origin from the three companies named above. In France there are many noted raisers, the most important productions from France to-day being from Pernet-Ducher of Lyons.

In purchasing roses it is essential to secure the bushes from the most reliable growers. The roses which are the most satisfactory have generally been budded on seedling briar stocks, and thus a vigor of growth is attained which could only be produced by many years of growth of the rose on its own roots. Moreover, the Hybrid Teas and several of the Hybrid Perpetuals will bloom the same season as when transplanted when on the briar, so that the rose garden may be realized soon after planting. In some cases the own-root roses are to be preferred, and again some are better on the Manetti stock than on the briar and the choice may lie further with the soil. Most of the reliable growers, however, have determined the proper stock which is most suitable for garden growth and furnish them in accordance.

For some time past I have attempted to make a yearly list of the most successful roses in my garden, and by comparing these have evolved a list which has been condensed to a total of fifty varieties which might be recommended as suitable for the rose garden. The list has been made up of the Dwarf Bushes, Large Bushes, Climbers, Dwarf Polyanthas and Mosses. This is a list based on what I would personally choose were I limited to fifty varieties, and is generally, for each color, in order of my preference. Further, were the garden to be limited to fifty roses in all, not fifty varieties, I would be most content with a certain list, and were it to be limited to 100 roses a further list would be selected. In this manner it is possibly easier to show a balancing of the various varieties as to the suitable number of each.

I do not attempt to go beyond the 100 selection, as when the gardener graduates in rose growing he will only be satisfied by investigating himself, and the field then is very wide.

The list follows: These further include the general color description and the blooming period and later is a brief description of each rose named.

LIST OF GARDEN ROSES.

List Number	Name of Roses	Included in Selection of 50 Roses	Included in Selection of 100 Roses	Class	Colour	Flowering Season
Dwarf Roses						
1	Frau Karl Druschki	5	5	H.P.	White	June-Oct.
2	Prince de Bulgarie		3	H.T.	Blush	"
3	La Tosca		4	H.T.	"	"
4	Madame Ravary	5	5	H.T.	Yellow & Orange	"
5	Arthur Goodwin		2	Per.	" "	"
6	Sunburst		1	H.T.	" "	"
7	Soleil d'Or		1	Per.	" "	"
8	Old Gold	2	2	H.T.	Shaded Orange	"
9	Irish Elegance	2	2	H.T.	" "	June-Nov.
10	Betty		2	H.T.	" "	June-Oct.
11	Joseph Hill	5	5	H.T.	Shaded Pink	"
12	Mme Leon Pain	4	4	H.T.	" "	"
13	Mme Segond Weber		2	H.T.	" "	"
14	Lyon Rose		2	Per.	" "	"
15	Mme Abel Chatenay	5	5	H.T.	Pink	"
16	Lady Ashtown		2	H.T.	"	"
17	Mrs. John Laing		1	H.P.	"	June*
18	Mrs. E. G. Hill		1	H.T.	"	June-Oct.
19	Lady Alice Stanley		5	H.T.	Rose	"
20	Paul Neyron		2	H.P.	"	June*
21	George Dickson	1	5	H.T.	Scarlet Crimson	July-Oct.
22	Richmond	4	2	H.T.	" "	"
23	Gloire de Chedane Guinoisseau		1	H.P.	" "	"

List Number.	Name of Roses.	Included in Selection of 50 Roses.	Included in Selection of 100 Roses.	Class.	Colour.	Flowering Season.
Dwarf Roses						
24	Hugh Dickson	......	1	H.P.	Scarlet Crimson	July*
25	General McArthur	5	5	H.T.	Crimson	June-Oct.
26	Lieutenant Chaure	......	2	H.T.	"	"
27	Ulrich Brunner	4	4	H.P.	"	"
High Roses						
28	Una	......	1	Hyb. Brier	White	June*
29	Nova Zembla	......	1	Rugosa	"	"
30	Trier	1	1	Multiflora	Cream	June-Oct.
31	Gustav Regis	......	1	H.T.	Pale Yellow	"
32	Danae	......	1	Multiflora	Yellow	"
33	Lady Penzance	......	1	Penzance B.	Copper	June
34	Conrad Meyer	1	2	Rugosa	Pink	June*
35	Zephyrine Drouhin	1	2	Bourbon	"	July-Oct.
36	Rugosa	......	1	Rugosa	Dark Rose	July
37	Gruss an Teplitz	1	2	H.T.	Crimson Scarlet	June-Oct.
38	J. B. Clark	......	1	H.T.	Crimson	"
Climbing Roses						
39	Climbing Frau Karl Druschki	......	1	H.T.	White	"
40	Alberic Barbier	......	1	Wichuriana	Blush	June
41	Wm. Allen Richardson	......	1	Noisette	Yellow	July-Oct.
42	Dorothy Perkins	1	1	Wichuriana	Pink	July
43	Climbing Caroline Testout	......	1	H.T.	"	June-Oct.
44	Tausendschon	......	1	Multiflora	"	July
45	American Pillar	......	1	"	"	"
46	Crimson Rambler	1	1	"	Crimson	"
Dwarf Polyantha						
47	Jessie	1	1	"	"	June-Nov.
48	Leonie Lamesch	......	1	"	Copper	June-Oct.
Moss Roses						
49	Comtesse de Murinais	......	1	Moss	White	June-Nov.
50	Common Moss	1	1	"	Rose	July

ABBREVIATIONS :—H.P., Hybrid Perpetual ; H.T., Hybrid Teas ; Per, Pernetiana.
* After name of month means occasional blooms during summer.

In this list of roses it may be that many growers will not find their own favorites. I already anticipate that such will be the case, but I will justify my selection as being from my own experience and from my own preference. For example, Killarney is omitted. This well-known rose seldom produced a perfect flower in the garden, but would tend to a dull edge on the petals, and even otherwise for me it will not compare with the four under "Pink" which are named.

In the following is a brief description of the roses in the list:

Frau Karl Druschki. This is *the* white rose, perfect in shape and substance of petal, a gleaming white of large size and during the first blooming period the three buds terminating each stem open simultaneously producing a massive effect, each of the flowers being a good five inches in diameter. The plant is extremely vigorous, developing into a high bush as the season advances. This rose has no perfume, and this demerits it from being possibly the most perfect rose. The leaves crowding around the terminal blooms greatly add to the setting.

Prince de Bulgarie. A moderately sized bloom variable in color, pale blush with an apricot centre. A perfectly formed flower and especially good in autumn.

La Tosca. Blush to pale pink in color; one of the best autumn roses. The bush is very strong growing.

Madame Ravary. Pale orange-yellow with apricot centre, dwarf growing; a splendid decorative rose and an excellent bloomer.

Arthur Goodwin. Copper and orange shading to Salmon pink. Free flowering and most beautiful in the bud; the flowers open flat. This is one of the new Pernetianas.

Sunburst. This is one of the new roses, and is suitable for both garden growing and for forcing and has lately become quite popular as a florist's rose. The blooms are large and shapely and of clear yellow color although they sometimes open quite white. It is a good bloomer throughout the summer.

Soleil d'Or. This is especially attractive as the parent of the Pernetiana Class. Its great glory is its color, a rich orange-yellow shaded with nasturtium red. The leaves are a vivid green and the bark is of a reddish hue.

Old Gold. In the half opened bud Old Gold is most beautiful; the rose is only semi-double, which permits the petals to have a loose setting in the bud, and with its vivid reddish-orange and its wonderful shadings it is most beautiful.

Irish Elegance. I think that this rose gives me more pleasure than any in the garden. It is single, each flower being about three inches or more in diameter. The bud from the first moment it can be recognized as such has a wonderful orange-scarlet color, and, as the bud is opening, the petals loosely unfurl, displaying the tassel of stamens and the rich apricot shadings. The sun plays havoc with the color in the opened petals, but, if picked as the buds are opening, it becomes quite the most decorative flower imaginable. It is one of the first to bloom and in November when practically all the other roses refuse to open their buds, Irish Elegance still holds sway. The leaves are exceptionally beautiful.

Betty. This is another rose exquisite in the bud form; the color is a copper-rose shaded yellow. Betty is excellent in autumn.

Joseph Hill. I have for several years said that if I could grow but one rose it would be Joseph Hill. The opening buds and the full flowers with their glowing shades of pale pink suffused with yellow have the greatest charm. The leaves have the appearance and the substance of English Holly, and are quite different from all other rose leaves. There is one fault with Joseph Hill, and that is that in its summer growth it is apt to throw all its strength into a single panicle of flowers; this may be checked by cutting off the sturdy shoot when it appears.

Mme. Leon Pain. This is also one of the best garden roses. The flowers have delightful form and its color is a silvery blush with a salmon centre.

Lyon Rose. A shrimp pink with orange-yellow at the base of the petals; the color varies, however, to nearly all pink. It has good form and size. The plant is not very strong and the blooms generally seem too heavy for their stalks. This is an extremely popular rose.

Mme. Abel Chatenay. This I place at the head of my list of pink roses. The flowers are a bright salmon pink with a paler reflex of the petals and are of medium size but of splendid form.

Lady Ashdown. Deep pink in color; blooms very freely and the plant is vigorous in growth.

Mrs. John Laing. This is a Hybrid Perpetual of large size and won great fame for itself in the early days of rose exhibitions in England. The color is a bright rosy pink and the fragrance is delightful. It is somewhat shy of second blooming.

Mrs. E. G. Hill. This rose and Richmond are quite the most continuous blooming roses known. Mrs. E. G. Hill has a pink flower with a coral-red reverse and large free petals. While its form is rather loose it has so many charms as to claim a place in any garden.

Lady Alice Stanley. A large flower of deep coral rose color and good form.

Paul Neyron. A most delightful rose. Immense in size and very fragrant. A Hybrid Perpetual and one of my great favorites.

George Dickson. One cannot imagine a more perfect rose. A velvety black scarlet-crimson of great size and depth. The plant must be well established before it will bloom, but waiting a year or so will repay the growers, as, undoubtedly, nothing can equal it. The leaves are enormous, thick and leathery. It resembles a Hybrid Perpetual in its habits rather than a Hybrid Tea, but I was very successful this year in obtaining three sets of blooms, while, in England, but one is expected.

Richmond. This is a most satisfactory rose for a small garden. It is always in bloom and never seems to tire. It has a beautiful scarlet-crimson color, which, however, under the rays of the sun quickly fades to a purplish-crimson. Its fragrance is delightful.

Gloire de Chedane Guinoisseau. The only objection to this rose is the elongated name. The roses, when disbudded, are quite the largest I have ever seen and each terminates in a very long stem. The color is an intense scarlet-crimson.

Hugh Dickson. One of the finest of the Hybrid Perpetuals. It has a very vigorous growth, almost rampant, its color is a good scarlet-crimson and it has a delicious perfume.

General McArthur. This is a splendid rose for the garden, large, good shape, lasting and of an excellent color.

Lieutenant Chaure. This has the best form of crimsons in my list, medium size, fairly frequent bloomer and a good growth of plant.

Ulrich Brunner. This is a very strong growing Hybrid Perpetual, prolific as to bloom, good color and most delicious perfume.

Una. A rose which grows splendidly in bush form. It is a single large-flowered Hybrid Briar, creamy-white in color, and is quite liberal in bloom.

Nova Zembla. A Hybrid Rugosa, a white from Conrad Meyer, which is described later, its habit is similar to the latter rose.

Trier. Trier is one of the few continuously blooming multifloras, but promises to be the forerunner of a very valuable race of roses. It is a delicate cream in color, grows to excellent size and with me is notably free from disease and pests.

Gustave Regis. A splendid rose bearing delightful long buds of canary yellow, tinted saffron. This rose is a profuse bloomer in summer and autumn and forms a large-sized bush.

Danae. This is derived, I believe, from Trier, the rose described above, but it has a wonderful rich yellow color. It was well covered with bloom the latter part of October this year.

Lady Penzance. One of the Penzance Briars, a development from the Sweet Briar. The rose is single, of a coppery-yellow color. One of the most delightful features is the fragrance of the leaves.

Conrad Meyer. This is one of the most valuable roses for the garden, and I cannot speak too highly of it. It grows from six to eight feet high in a massive bush composed of a large number of stout thorny shoots and is clothed with a splendid display of leaves. The flowers are about five inches in diameter of fair form and of a silvery pink color. The fragrance is splendid. A bush in flower is a magnificent sight. One bush in my garden this year was tied in a compact pyramidal shape about six feet high and had about 150 of these roses adorning it at one time, quite excelling anything that imagination could draw. The hybrid rugosas are perfectly hardy, needing no protection whatever.

Zephyrine Drouhin. This is the old "Thornless Rose." (Conrad Meyer just described should be called the "Thorniest Rose.") It is a bright pink—a carnation pink, free flowering, very sweetly scented and thornless. It makes an excellent bushy growth when trained. It is remarkably free from pests and should be in every garden.

Rugosa. This is the wild type of the Japanese Rose and makes an excellent bush. One of its charms is that the heps form brilliant red berries which stay on the bush.

Gruss an Teplitz. Bright crimson, free flowering and showy, delicious perfume.

Climbing Roses, Stratford.

J. B. Clark. A vigorously growing rose having big flowers which, however, quickly lose their rich color.

Climbing Frau Karl Druschki. A splendid climbing variety of this indispensable white rose.

Alberic Barbier. A climber with brilliant shining leaves. The flowers are in clusters and a cream in color with yellow centre.

William Allen Richardson. A splendid climber with small neat orange-colored flowers. Splendid in autumn.

Dorothy Perkins. One of the best climbers. Beautiful pink flowers in large clusters. This blooms in July.

Climbing Caroline Testout. A very fair climbing rose with large flowers. Caroline Testout appeals to me more as a climber than as a dwarf bush rose.

Tausendschon. The flowers are large, in clusters, of soft rose color and are freely produced on the climbing plant.

American Pillar. One of the most charming of the Multiflora Climbers.

Crimson Rambler. This is the best known of the climbers and cannot be excelled for vigorous growth and flowering. It has, of course, but the one period of blooming except in exceptional cases.

Jessie. This is a dwarf Polyantha, always clothed, from June until November with a great display of brilliant bloom. It should be very effective when planted in masses.

Leonie Lamesch. Another dwarf Polyantha with bright coppery-red flowers with golden centres. This has a very fascinating fruity perfume.

Comtesse de Murinais. This is classed as a moss, but its mossing is not very prominent. The growth of the plant is excellent and the long white flowers are gathered in a tassel at the end of each stem.

Common Moss. This is one of the best examples of the Moss Rose for the garden.

PRESIDENT: The rose seems to be as popular as ever, and I am quite sure that the paper that Mr. Mitchell has read is one that has been very interesting to the most of us. A year or so ago I planted Hybrid Teas, and they gave me splendid results. The only thing you do is to tie them up eight or ten inches, and they will give you better results than the Hybrid Perpetuals which will flower in June only. And the colors of those that have been crossed with a briar such as the Lyon Rose and one or two others of that kind, are simply beyond description.

WM. HARTRY: It was a happy thought at our director's meeting last September to have us decide on this item on the programme. There are, however, some roses that have not been mentioned, one particularly that I have grown myself, and that is the J. B. Clark. I think that is, possibly, one of the best of the highly colored roses. I had a bed in my garden about seven feet across, and I put the J. B. Clark in as a centre. This year, however, it grew so much that it crowded the rest out. I got an English rose book and I learned from that that we had been making a mistake with those J. B. Clark roses in cutting them back—that we should preserve the entire stalk or stem and protect it in the winter. If you take it and lay it down carefully, swing it around so that it will lie down, covering it over with leaves and put some strawy litter upon that, then straighten it away, bend the stalk over and pin the top down in three or four places in the form of an arch, it is the grandest sight I ever saw. I had a bed of this this summer and it bloomed until three or four weeks ago. I do not think there is anything in the rose line which could be more satisfactory; nothing was enjoyed so much in my garden this summer as that rose, except, perhaps, the Crimson Ramblers. I would like to say one word about ramblers. The Crimson Rambler has been the popular rambler, but if it is not very carefully watched it mildews. I find the Philadelphia Rambler is very much better. There is a new rose which I have grown, "The Excelsior," which I think will supersede the Crimson Rambler altogether.

J. H. BENNETT: I overlooked the name of one. If you want a high-colored rose get the "Juliette." It is orange, crimson and pink combined.

A DELEGATE: What do you do for black spots?

WM. HUNT: This year at Guelph we used, the early part of the season, lead arsenic. It is a spray used for insects rather than fungous diseases. It has been used in English nurseries and the beginning of the season at Ottawa, and it certainly did keep the roses perfectly clean, but the objection is that the appearance of the rose bushes was not attractive, having lead arsenic on the leaves all the season. Of course it is the most practical method, because the arsenic is released from the combination of the lead at any season of rain or dew, and it forms a sort of acid upon which the fungus cannot germinate. We use, of course, ammoniacal carbonate of copper, but in a wet season it is not very effective as the rain washes copper off very quickly, and it is not as adhesive as lead arsenic. One of the leading amateurs in England, I think it was in September, tried out one of the sprays that is very often used in connection with potatoes. We tried it out in conjunction with the ammoniacal carbonate of copper but it was not satisfactory this season. Of course you cannot condemn any spray unless you carry on experiments for a number of years because so much depends on the season. It is very difficult to say at the present stage what in Canada is the best spray all around for roses.

ADDRESS.

W. B. Roadhouse, Deputy Minister of Agriculture, conveyed the greetings of the Department and expressed the hope that from this gathering would go forth an inspiration and enthusiasm which would make this Province a still better place in which to live.

HORTICULTURE IN NORTHERN ONTARIO.

Mrs. Lorne McDougall, Haileybury.

Our northern climate is a fascinating one. A fine day comes and it is so exhilarating that all memory of other less pleasant weather is obliterated. Fortunately, there are very many fine sunny days. It is a changeable climate. I have lived seven years in Haileybury and cannot recall two seasons alike. But the gardens grow in every kind of season.

We have no genuine spring. Severe nights continue through the greater part of April. Spring may show herself for a while in May, but summer (with an occasional disconcerting, sometimes disastrous reversion to winter) is upon us with the coming of June. If the nights are still wintry when April comes, the mornings are already long. The sun rises at last in early summer shortly after three o'clock, and in June and July the daylight lingers until ten o'clock.

Horticulture in Northern Ontario owes a great deal to the British gardeners who have settled there, for the methods that suit the home climate seem to be what is needed for success with us. But operations must be conducted literally "on the run"; naturally, this rush and hurry tends to make gardening expensive.

For these reasons fall digging is advisable. In fact it is better to do all possible work in the autumn. All perennials, biennials, and shrubs should be planted or moved into position then.

Fall seeding might be practicable. I notice that nicotine, candytuft, pansies, schizanthus, produce fine plants from self-sown seeds.

Generally speaking, the hot-beds should be started by the middle of April. Then follows quickly the pricking out and the hardening off in the cold frames. It is very important indeed, that the little plants should be well hardened off. My experience is, that this *early start* in hotbed, or window garden, or small greenhouse, or for some plants (such as asters) simply in the cold frame, is the essential thing in all gardening of flowers and of many of the finer vegetables.

Along Lake Timiskaming we suffer less from unseasonable frosts than farther north and a well-protected garden suffers little. A high fence towards the north and west or a wall of fir trees are valuable possessions. A prospective gardener is recommended to make a study of protections against frost and cold winds suitable to his plot of ground. They might, too, add much to its beauty. With intelligent planting and a proper use of protections a garden can be enjoyed from the middle of May until the end of October.

As in other parts of the Province, the cutworm has been a very serious enemy this past season. He spared nothing in June that he could reach, large tomato plants, beets, carrots, strong vigorous growths in no danger formerly, all were felled.

ANNUALS. I doubt if there is any other corner of our Dominion where annuals thrive better. I have one border 125 feet long and ten feet wide devoted entirely to hardy annuals. Nothing is planted there that the first early autumn frost will injure. At the back grow miniature sunflowers, nicotine, and early cosmos—then come tall antirrhinums, and stretches of rosy salpiglossis with an occasional amaranthus—in front of them clumps of schizanthus changing with antirrhinums of shorter growth, an odd gladiolus here and there, playing sentinel—no abrupt transitions anywhere—and salmon and buff phlox drummondii and yellow pansies, and blue ageratum, and nemesias pink and yellow, and dimorphotheticas, and mignonette, all crowding against a line of sweet alyssum.

Nowhere do the antirrhinums grow taller or heavier of bloom, nowhere are the salpiglossis more velvety or brighter of hue, nowhere are the schizanthus more literally buried in fairy blossoms—and the heights of the plants as given in the catalogues are all understated. The stocks too, will stand quite severe frost and grow taller and sturdier and sweeter with us than elsewhere. They and the asters are the last flowers in bloom in the fall.

We get wonderful results in size and height with asters. It is an easy thing to grow an aster bloom seven inches across and they need no particular care. But with fertilizers and judicious pruning and constant cultivation certain varieties of asters will rival the chrysanthemums. Asters are, perhaps, more exacting to grow than other annuals. They are oftener attacked by insects and generally lose some of their number through stem rot.

I never put zinnias in my more exposed borders for they are easily injured by frost. But grown in sunny, protected situations there is no flower that blooms more profusely, truer to form and color, absolutely *Robusta Grandiflora Plenissima Maxima.* Nor do I care for marigolds in prominent places. Provided they get an early start they certainly grow and bloom riotously.

This past summer produced some extraordinary dahlias. We grew decorative dahlias as large as a dessert plate and very lovely. The Peony and Cactus Dahlias, the former almost as large of bloom, were really the queens of the garden, some of them quite ten feet high, their graceful flowers of such exquisite colors hanging over everything. Each year some one flower grows to special perfection, and this season, with us, it was the Peony Dahlia.

Sweet peas must not be forgotten. To attain good success—and the results are very fine, comparable to anywhere in the world—these things are necessary: The finest seed obtainable started in pots in the hotbed, and directly up, removed to a cold frame where they are kept until the weather is well settled, probably the first week in June, sometimes later, and then transplanted to specially prepared soil. In one of the gardens in Haileybury, that of Mrs. C. A. Foster, the sweet peas grown from Sutton's seeds in this way are very remarkable. The method of planting is unusual and worthy of imitation. The vines are set out in short rows across a long open border about eight feet wide. Each row is four feet apart growing one variety of sweet pea. The supports made of wire netting nailed to a narrow wooden frame painted green serve from year to year.

Perennials. We have had particular success with perennials and are confident that any hardy perennial will thrive. True, the thermometer goes low, but the snows come early and there is little danger of a thaw. Slight coverings are needed against the hot spring sun rather than against the frost.

The iberis is the first to appear in the border. Then when the lilacs are a fragrant blending iridescence of color come the tulips, the daffodils and the narcissus. The Iceland poppies and the pansies follow, and then, the long-spurred columbines, the pyrethrums and forget-me-nots, all such charming neighbors. Then come along the coral-red sweet williams, frosted blue and pink canterbury bells and Shasta daisies; then the oriental poppies, the peonies, the feathery astilbes, and in midsummer the delphiniums. We must stop to admire them. How tall they grow, with their burnished blues and lavenders, their clear brilliant blues, their dark rich black blues, their grey and silvery blues, their many different types of doubleness, their variety of centres, their long thick spikes, fairy godmothers' wands. Were I boasting of gardens, I should certainly add that nowhere out of Kelway's or Lemoine's catalogues do such delphiniums grow. The giant hollyhocks succeed them, vieing in beauty with the phloxes so prodigal of bloom and color.

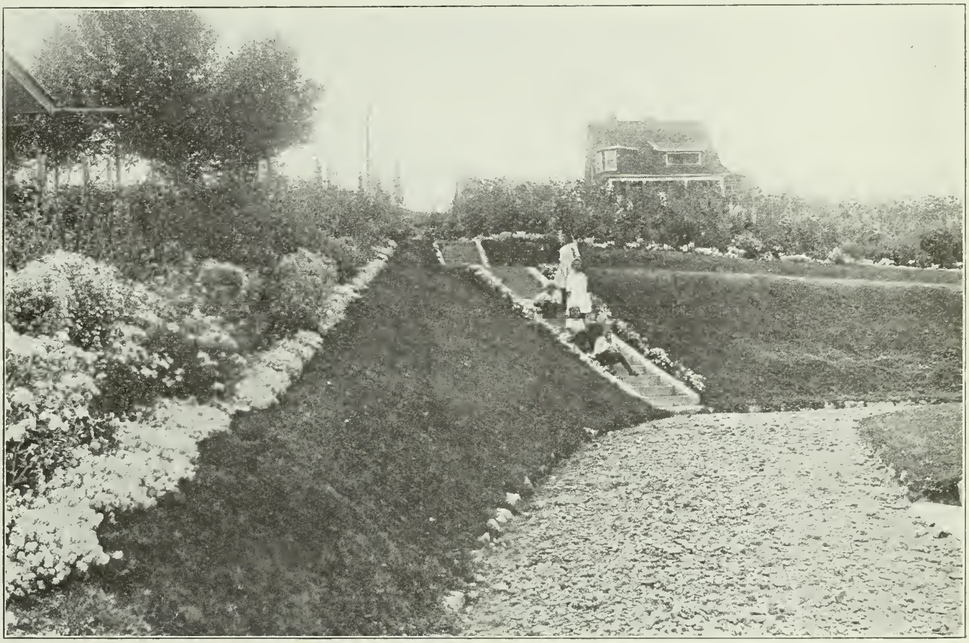


Photo by Mrs. Lorne McDougall.

A Haileybury Garden.

Roses are, similarly, of the easiest cultivation. I saw a bunch of rosebuds picked in October looking like July. But I am convinced there is no perennial, with the exception of some of the lilies, which cannot be grown with equal, often, with more gratifying success, than in milder latitudes.

Vegetables. The same methods used to grow flowers are applied to vegetables. The out-door seeding is accomplished usually from May 20th to the first week of June, when all the first seeding should be finished. Lettuce, spinach, peas, carrots and beets may be grown in succession, but I do not find that sowings do well made later than the middle of July. It is possible to grow a constant supply of green peas extending from the middle of June, if the season is good, until the garden is entirely over. But to accomplish this, a planting of an extra early variety, a couple of second early varieties such as the well-known gradus, and several high varieties, each one bearing a little later than the other, give the best satisfaction. The high varieties grow to ten and eleven feet and often eleven peas to the pod. Two or three years ago we had wonderful results from the pea called the "Alderman." It started bearing about the second week in July and continued indefinitely until weather conditions conquered. Lettuce is grown with great ease, and I think to greater perfection of flavor and crispness than in Old Ontario. I have tried many different varieties and prefer the American varieties of Cabbage lettuce and the English Cos. There are few things to equal a head of Cos lettuce well bleached, with that richness of flavor the gift of our northern climate, a salad for an epicure. What is true of one vegetable is true in degree of practically all, with the exception of corn. The northern vegetables, like the northern flowers, excel in quality. When sold, they should command a higher price. The carrots are tenderer, the beets are sweeter, the cabbages are finer grained and firmer, the beans are more brittle, and richer flavored, the peas—why no one has really eaten green peas who has not tasted the first picking off a North Ontario vine. Corn is grown successfully, and if an early supply is started in the hotbed it is possible to have a crop from August first into October. But we succeed best with the early varieties and none equal the Golden Bantam.

As with flowers, you can grow any unusual or less hardy vegetable you fancy if you take the necessary forethought, and the result more than justifies the trouble. Around New Liskeard fine celery is grown. I have never seen better than exhibited at the Liskeard Fair this autumn. The onion exhibit was also noteworthy. In a large vegetable garden near mine fall strawberries are a feature. I picked a handful well on in October and found them as sweet as in their usual season.

The Haileybury Horticultural Society has done a good work with their yearly show. It is always well attended and the results are seen around the town and country in improved gardens. Each year we see finer varieties of flowers and vegetables grown. Each year we have a better choice of vegetables on the market.

I would emphasize, in conclusion, that the best results come from the best seeds obtainable. It is amazing sometimes what results the very fine seeds brought from other parts of the world will bring, planted in the richly productive soil of our Northern Country.

Moved by R. W. Brooks, seconded by W. B. Roadhouse, Deputy Minister of Agriculture, that a very hearty vote of thanks be tendered Mrs. McDougall for her very interesting paper read. Carried.

Mr. R. Whorley then showed various vegetables and some strawberries just gathered from the plants. A turnip was shown weighing 18¼ pounds grown from Carter's seed. Also a carrot, Early Nantes, Mr. Whorley saying he had an acre of carrots from which 604 bags to the acre were taken. Also he showed some onions grown from Ailsa Craig seed, remarking that Mr. Hunt, from Guelph, had told him they had had difficulty at the College in ripening onion seed; some fine samples from Carter's Renown, from Set Onions and from the Red Wethersfield, also a fine sample of Twin Parsnips. He repeated that there could be grown in the North Country anything from strawberries to turnips.

NOTES ON NEW PLANTS AND PLANTS NOT WELL KNOWN.

Wm. Hunt, Ontario Agricultural College, Guelph.

The ever-increasing demand for something new in the floral world is perhaps more intense at the present time than at any period in the history of floriculture. This sometimes leads to the introduction of varieties that are often introduced with a great flourish of trumpets in the way of advertising; varieties which, on actual test, under ordinary every-day conditions, disclose some point of weakness either in habit of growth, color, or perhaps in the constitution or endurance of the plants, that make them worthless to the general plant grower. Taking these facts into consideration, I shall first endeavor to give a brief review of some of the newer or less known plants that have been tested in the College flower borders and grounds during the past five years, most of which have been noted in the reports of the Ontario Horticultural Association during the period mentioned. Those that have shown special suitability for the amateur's garden only will be noted, with date of year when reported on.

Annuals.

1910. *Calendula Trianon* and *Calendula Meteor.* Height 1 ft.; are still considered improvements on the older types of these easily grown, enduring annuals. The rich coloring of the flowers and the extremely late-flowering habit of these plants in the border make them very acceptable at this late season of the year when almost all other flowers are past and gone.

Coreopsis marmorata. 1½ ft. The bronzy-brown flowers of this variety give it a place among these useful border plants. It is a distinct addition and relief to the yellow-flowering varieties in a collection of these flowers.

Hyacinth Flowered Candytuft. The large and enduring spikes of flowers of this new type of candytuft still holds its superiority over the older type of these flowers.

Sunflower. Starlight. 3 to 4 ft. This miniature and free-flowering type of sunflower is very acceptable as a decorative plant in the border, and will furnish a bountiful supply of its lemon-yellow blooms, that are so effective for cut-flower decorations.

Dimorphotheca aurantiaca. 6 inches. This pretty orange-colored daisy, originally introduced from South Africa, makes a very pretty, showy border plant, more especially during the hot summer weather when sunshine is abundant. It is a sun-loving plant, closing up its flowers in dull weather, which makes it almost useless as a cut flower. As a border plant, especially on rather light sandy land, it is very effective.

1911. *Diascia Barbarae.* 1 ft. Can be recommended only to those who would delight in its pretty, odd-looking flowers. It is not robust enough for the average flower grower.

Eschscholtzia Thorburni. 1 ft. A beautiful form of the Californian poppy, but often reverts more or less to the older types. When produced in perfection, the rich, bronzy-crimson coloring of its flowers is indescribably beautiful.

1912. *Rainbow Corn.* 3 to 4 ft. The highly-colored foliage of this decorative maize still gives it a place as a background for a border. Care must be taken in the selection of the seed to secure the best results.

1913. *Centaurea cyanus flore pleno.* 3 ft. This double variety of cornflower can still be recommended as superior to the well-known single types of these flowers, especially as a cut flower.

Red Sunflower. 4 to 5 ft. This variety of sunflower, first introduced by Messrs. Sutton & Sons, England, is growing in popularity where an easily grown, effective border plant is required, its rich bronzy-red and gold flowers of medium size making it conspicuous as a border plant, and also acceptable for decorative purposes as a cut flower, where large quantities of flowers are required.

Tender Perennials Grown as Annuals.

Brilliant Rose Petunia. 1 ft. This variety, also a production of Sutton & Sons, is very effective in masses in the border or as an edging plant. There are several different colors of this compact, dwarf-growing type of petunia, that are now catalogued by almost all of our seedsmen.

Pentstemon gloxinioides. 2 ft. The newer types of these make excellent summer bedding plants. They grow from 18 inches to 2 feet in height and are something of the same habit as the tall-growing snapdragons. The seed requires to be sown early in March indoors, to get the best flowering results.

Hardy Border Perennials.

1910. *Anchusa Italica.* 4 ft. Although a plant of a rather coarse nature in growth, its showy, deep indigo-blue flowers, produced in profusion from midsummer until quite late in the autumn, make this plant a conspicuous object in the border. For large perennial borders or in the foreground of shrubberies it is very useful. It is self-seeding and reproduces itself from seed readily; it requires to be kept within bounds on this account.

Dianthus latifolius flore pleno. (Ever-blooming Sweet William.) This double-flowering type of the Dianthus makes a very showy border plant. It succeeds best treated as a biennial.

Primula cortesoides Sieboldii. 8 inches. (*Primula Sieboldii.*) Planted in a rather light soil rich in humus, in a partially shaded part of the border, this pretty little hardy dwarf primula will give splendid results. It reproduces itself from seed quite readily in the border. Its white and carmine flowers produced in successive whorls or tiers are a source of delight to all flower lovers in early summer.

Greenhouse Perennial.

Primula malacoides. 12 inches. One of the best new flowering greenhouse and window plants introduced for several years. Both the white and pink types—the latter in various shades of pink—are very dainty, graceful-looking, decorative pot plants.

Hardy Border Perennials.

1913. *Chrysanthemum Arcticum.* 3 to 4 ft. One of our best autumn-flowering hardy ox-eye, daisy-like chrysanthemums. A plant of this covered with its white flowers helps to brighten the border very materially in early autumn. It propagates readily from seed or divisions, and is of a hardy, enduring nature. Not a new plant, but not as well known as it deserves to be.

Pentstemon laevigatus digitalis. 3 ft. Given a good rich garden soil, this hardy Pentstemon makes a good showing with its foxglove-like flowers. The dwarf type, often sold as *Pentstemon gracilis,* that grows about a foot in height and gives a profusion of white and purple flowers in late summer and autumn, is a very free-flowering, attractive little border plant.

Scabiosa Caucasia. 18 inches. This perennial type of the well-known "Pin Cushion" plants (taking the common name from the similarity the flower heads bear to a pin cushion) gives to flower lovers its lavender-blue flowers late in the season, when few blue flowers are to be seen in the garden.

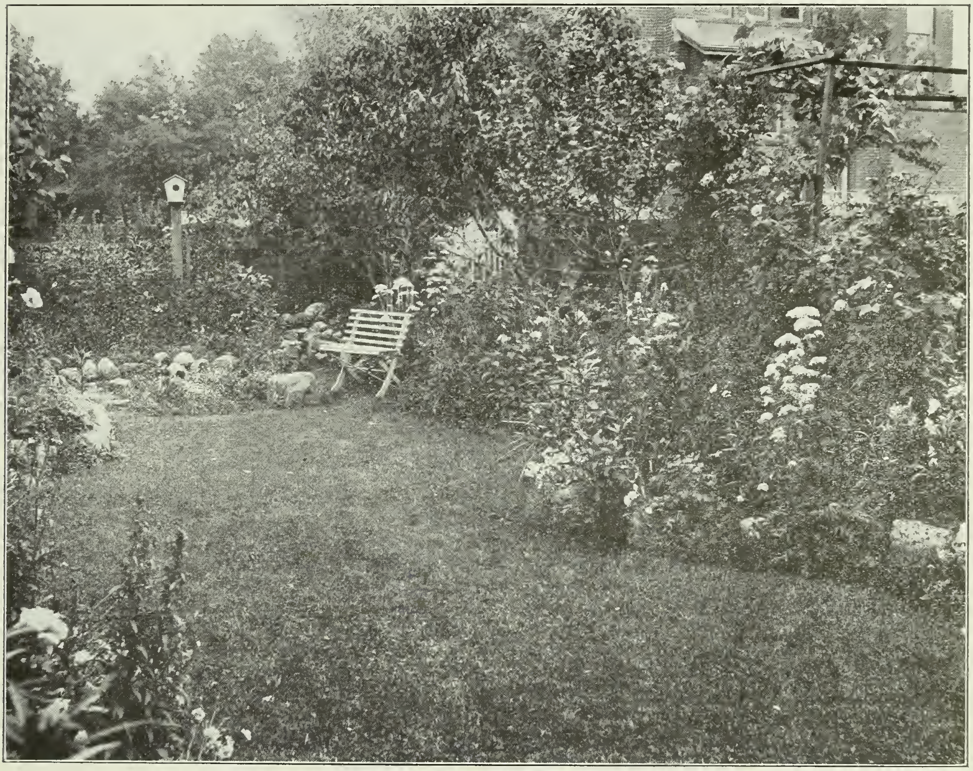


Photo. by G. Barton.

In a Hamilton Garden.

1913. *Dictamnus* or Gas Plant. 2 ft. A good, hardy border plant with attractive deep green foliage that makes it a decorative feature, even when not surmounted with its sweetly perfumed spikes of white or purple flowers. It is also suitable for forming a lawn hedge.

Salvia globosa. A specimen plant of this Salvia makes a great showing in the border in early summer. Its silvery, pubescent foliage, surmounted by its profuse branches of creamy-white flowers, together with its globular habit of growth, make it a very noticeable plant among the more sombre green foliage of most occupants of the border. To get the best results, this plant should be treated as a biennial, as the old plants do not flower so well the second year, and oftentimes get weakened down, if not killed out altogether. A light protection of garden trimmings such as old flower stems is advisable during winter. Avoid covering it up with heavy, close, protective material.

GARDEN IRIS (FLEUR DE LIS).

About one hundred varieties of these favorite hardy perennial plants have been under observation in the College gardens for two years past. The stock was obtained from Mr. Bertrand H. Farr's nursery at Wyomissing, Penn., and contained most of the newer varieties introduced up to that time, so that we are reasonably sure of their being true to name. Mr. Farr, it will be remembered, gave us a very interesting and instructive paper on "Pæonies and Perennials" at our last Convention.

The following list of twenty-five of the varieties grown that will make a good list for an amateur's garden, is herewith submitted. A few notes on the height, habit of growth, color of flowers, etc., of the different varieties is also given. The list also includes varieties that will give a succession of bloom, so as to cover the flowering season from about the middle of May until the middle of June.

Name	Height of Flower Stem	Date of Flowering	Main Colors	Remarks
Kochii	15 inches	May 26th	Dark purple	Showy
Florentina	2 feet	" 26th	Creamy white, shaded lavender	Dainty
Tinnae	3 ft. 6 in.	" 28th	Lavender blue	Robust. Lasting
Souvenir	18 inches	" 28th	" "	Large flowers
Gracchus	2½ feet	" 30th	Bronzy-crimson and white	Distinct
Mrs. Neubronner	18 inches	June 1st	Rich golden	Effective
Lady Seymour	2 feet	" 1st	Lavender, violet and white	Desirable variety
Idion	18 inches	" 3rd	Golden yellow	Bright
Mrs. H. Darwin	2 feet	" 3rd	Almost pure white	Distinct
Ardenta	"	" 5th	Lavender blue, shaded darker	Showy
Rigoletto	"	" 5th	Bronzy-brown and white	Handsome
Honorabilis	"	" 5th	Old gold and bronze	Beautiful
Neglecta	"	" 5th	Lavender, blue, purple and white	Effective
Arnols	18 inches	" 5th	Rosy bronze purple	Showy
Dr. Bernice	2 feet	" 7th	Coppery bronze and crimson	Large flowers
Innocenza	"	" 7th	Ivory white and gold	Beautiful
Mme. Pacquitte	3 feet	" 7th	Rosy claret	Handsome
Mme. Chereau	40 inches	" 7th	White and blue	Very showy
Othello	3 feet	" 8th	Blue and dark velvet purple	Robust. Showy
Pameron	40 inches	" 8th	Yellow, rose and white	Free flowering Showy
Darius	2 feet	" 8th	Pale yellow, lilac and white	Very effective
Penelope	"	" 8th	White and violet, yellow beard	Pretty
Mexicana	18 inches	" 8th	Chocolate and gold	Free flowering
Australis	40 inches	" 8th	Pale lavender blue	Very showy
Jacquesiana	2½ feet	" 10th	Rich maroon and bronzy crimson	Very beautiful

To get the best results from this type of iris, they should be planted where they can have a good supply of moisture at the roots, and, if possible, planted where they are shaded from the hot sun for a few hours in the middle of the day. Hence they are useful for city gardens, for planting in the shade of buildings. Avoid planting iris too deeply, the fleshy rhizome roots should be on or near the surface of the soil. September is the best time to plant iris. They may be planted in early spring, but do not give as good flowering results the first year as when planted in the autumn.

HARDY CHRYSANTHEMUMS.

A number of these plants have been under test for several years and have given very good flowering results, especially during the past season. The greatest obstacle to success with them is on account of the attacks made on them in June and July by the small Tarnished Plant Bug (Lygus pretensis). This pest punctures and destroys the terminal point of growth of the plant, destroying the buds when they are in an embryo condition, causing the growth to produce blind or flowerless growth. The best partial remedy for these pests is to dust the terminal points of growth every few days in hot weather with pyrethrum powder.

Asters and dahlias are also badly injured in the same way by this pest. A good remedy for the attacks of this insect is badly needed by flower growers.

The following is a list of ten good varieties for planting in the garden. Early spring is the best time to plant.

Carrie (Also sold as Glory of Seven Oaks). Golden yellow.
Hermine (Pompon). White.
Cactus. Bronzy red.
Champagne. Ruby red.
Champ D'or. Golden yellow.
La Pactole. Bronzy gold.
La Somme. Mauve pink.
Eden. Rose red.
October Gold. Old gold.
Queen of Earlies. Pure white.

Plants of these hardy varieties have given good flowering results this season from August to the second week in November. There should be more of them seen in our perennial borders, brightening up as they do their whole surroundings at a time of the year when the garden usually looks forlorn and desolate.

Spring Flowering Bulbs.

An interesting test has been started at the College this fall with Early Flowering Tulips and the Darwin type of tulip. A consignment of seven different varieties of early flowering tulips was received recently from the Dominion Experimental Station at Sydney, Vancouver Island, B.C., with a request that a test of these Canadian grown bulbs be made with imported stock of the same varieties. As far as the appearance, solidity and size of the bulbs are concerned, they compare very favorably indeed with imported stock of the same varieties. It is to be hoped that the matter of growing bulbs in Canada may be made a success, as the amount of money sent out of the country every year for bulbs amounts to several hundred thousand dollars. The cost of production under different economic conditions, mainly cost of labor, may militate somewhat against the success of the undertaking, but with the help of the Dominion and Provincial Governments to start the project, it may be quite possible to make a success of the undertaking, both from a commercial and cultural point of view. We have also planted eleven different varieties of the popular Darwin type of tulip grown by Dr. D. Clarke, of Grimsby, Ont., who has for several years past been growing these bulbs from offsets or bulbils as an experiment. These Grimsby grown bulbs, like the B. C. grown kinds, were, if anything, superior in solidity, size and general appearance to the imported bulbs.

We shall watch with more than ordinary interest the comparative value of these Canadian grown bulbs compared with imported stock of the same varieties.

A list of twelve good varieties of Darwin and Rembrandt tulips will be found in the following varieties for the amateur's garden. These two types and the May flowering, or Cottage Garden tulips, as well as the Bizaire and By-bloemen tulips, are too seldom seen in our gardens. They are well suited for permanent planting in perennial borders, where they can be left undisturbed for several years, and will give good results. They are not as well suited for flower beds or borders where summer decorative plants are grown, as they do not like to be dug up or disturbed very frequently when planted. The early flowering tulips are best for the last named purpose, but these are not nearly as effective for permanent planting as the Darwins, Rembrandts, etc., first mentioned. These last named are rapidly coming into prominence and are very beautiful.

TWELVE DARWIN TULIPS.

Andre Dorian,
Anthony Roozen,
Charles H. Marot,
Clara Butt,
Dante,
Dream,
Europe,
Fra Angelico,
Gretchen,
Harry Veitch,
Mr. Farncombe Saunders,
Wedding Veil.

TWELVE REMBRANDT TULIPS.

Alladin,
Bellona,
Candida,
Diana,
Esopus,
Gretchen,
Le Printemps,
Marco Spado,
Purity,
Red Prince,
Sirene,
Undine.

TEST OF HARDY BORDER PERENNIALS.

In addition to the tests mentioned, over 200 different varieties of hardy border perennials, most of them new or not common varieties, were planted in the trial grounds last spring. They have not, however, been planted long enough to give any very definite information on them. These will be subjected to the severest winter test possible, as they are planted on a very exposed piece of ground and will not be given any artificial protection during the coming winter.

The following varieties have shown points of merit that will doubtless give them a place among the better known older types and varieties of these plants.

LIST OF PERENNIAL ASTERS (MICHAELMAS DAISIES) TESTED.

Anglica Rosea, 4 ft.
A. L. Fardell, 4 ft.
Beauty of Colwill, 4 ft.
Baldur, 4 ft.
Cordifolia elegans, 3 ft.
Dorwrochren, 4 ft.
Ericoides Enchantress, 2 ft.
Finchley White, 4 ft.
Mrs. E. N. Raynor, 4 ft.
Snowflake, 3 ft.
Thompsonii Dwarf, 18 in.
White Queen, 3 ft.

OTHER PERENNIALS TESTED.

Alyssum prostratum. Height, 10 inches. A somewhat similar plant in form and color to the spring-flowering type Alyssum saxatile. Flowers late in the summer and is more continuous in its flowering habit than A. Saxtile.

Caryopteria mastaeanthus. (Blue Spirea) 2 to 3 ft. Produces rich lavender blue flowers profusely along the branches from about the end of August until very sharp frosts.

Callirhoe involuctra (Poppy Mallow). 8 to 10 inches. A mallow-like trailing plant with flowers of a bright rosy crimson with white centre. The flowers are about 1½ inches in diameter. It flowers all the summer until late tutumn.

Liatris (Blazing Star of Gay Feather). 3 ft. A very showy, attractive, late summer and autumn flowering plant, bearing purplish-blue flowers in profusion on its tall spire-like growth from July until October.

Scabiosa japonica. 18 inches. A decided improvement on the Scabiosa caucasia, being of a much freer and continuous flowering habit, producing its lavender blue flowers profusely from July until quite late in the autumn. At this late date, November 10th, there are about twenty flowers on one plant. The habit of growth is more straggling than S. caucasia.

Silene Schafta. 4 inches. This plant might almost be taken at a glance for a summer flowering Phlox subulata or Moss Pink that brightens up the perennial border in early spring. This will prove to be quite an addition to late flowering dwarf perennials if it proves to be hardy. It flowers from July until October.

Photo. by F. T. Shutt.

Preparing the Rose Garden for Winter, Central Experimental Farm, Ottawa. Tying down the bushes to stakes before covering them with evergreen boughs.

Other tests of hardy perennial Phlox, Paeonies, Gladioli, Roses, and other plants have been made, but time will not permit of mention of these at the present time.

Rev. A. H. Scott: A gardener from Toronto who is a member of this Convention desires to ask a question in connection with this subject. "Towards the end of June, and in the beginning of July, one of the most superb of all hardy perennials, Ostrowskia Magnifica is in flower. It is a native of Bokhara. In the north of England it succeeds to perfection, growing to a height of seven feet. The Ostrowskia is so splendid a perennial that every effort should be made to provide for its requirements, for when in full bloom it is the glory of the garden. And no one who has once grown it would remain without it." Can you give us any information about it?

Wm. Hunt: I cannot. It has never come under my notice, and we have no plant of that kind at our College. We will try to get it in our collection. I am not in the habit of making any excuses regarding any of our work at the College, but we have been handicapped in our work a little by the very extensive building on the grounds. At the same time we have endeavored to keep track of something that I hope will be useful to the general public in that way.

A Member: I know the plant, but I have never succeeded in getting the seed to germinate.

J. H. Bennett: I have a friend who had some different Campanulas to anything I have ever seen, and he has sent me over a blue and white one and I planted it, and probably I can give you some report on the results of it next year.

EVENING SESSION.

J. Lockie Wilson: Before Mr. Adams speaks, I was in Washington at the American Civic Association's Convention last year, and Mr. Thomas Adams was one of the speakers at that Convention. I was sitting at the back of the hall, and heard remarks of the members of the Convention, and it was the concensus of opinion that Mr. Adam's address was the best ever given on Town Planning, in Washington. He is loaned to us by the British Government, and is working with the Conservation Commission for the improvement of Town Planning in this country, and I know that Mr. Adams has a treat in store for the members of the Horticultural Association.

TOWN PLANNING FROM A HORTICULTURAL STANDPOINT.

Thos. Adams, Conservation Commission, Ottawa.

I will endeavor to show you the relation which exists between the Garden and Town Planning. I hope I will not disappoint you by not touching more upon the social aspect of the question than upon the aspect which is perhaps more interesting—our own gardens. I want to try and deal with this matter in a somewhat comprehensive way, to show the importance of gardening and gardening association to the life of the people, and how much a society such as this can do to influence public opinion and assist in the development of art and the beautiful in relation to the home life of the people.

Town Planning is a somewhat elusive term, and perhaps it is hardly descriptive of the meaning which is given to it nowadays by people who are trying to apply more foresight and more intelligence to the laying out of our towns. It is a comprehensive term that is capable of application to the large city, to the small town and to the small village, even to the individual agricultural homestead.

In the large city we want to plan more for the future, in order to get healthier conditions of living for the people, in order to promote better facilities for carrying on our industries, and in order to make these industries themselves more attractive places to work in and more beneficial to our people than they sometimes are.

It deeply applies to the small town which in Canada is one of the most interesting phases of our community life. Since I came out to Canada I have been going about from Vancouver to Halifax, through the different provinces, visiting the different cities and small towns, and it is really very inspiring to go to small cities like St. Catharines, Simcoe, St. Thomas, and Stratford, of which there are hundreds, and see the healthy community life we have in the small towns of from 5,000 to 10,000 inhabitants, and there you see the opportunity for gardening at its best. And as I go along I hope I may be able to carry you with me in the argument which I will try to bring forward, that what we want in Canada is to develop the small town with its gardens and its boulevards all over our Dominion rather than go on creating great conglomerations of population in the large cities like Montreal and Toronto, not necessarily to detract from the importance of our great centres, but to develop rather the small healthy community life, and thereby on the one hand to prevent the unnecessary large cities which we have in some places and the depopulated rural country in the other.

Better Town Planning, especially as it gets in touch with gardening and gardens, affects not only the large city and small town, but it also gets us in touch with the village and with the farm. We need planning in our villages and we need better planning in our agricultural districts. One of the things which every observer of social conditions knows, is that one of the principal causes of rural depopulation is the absence of proper social facilities, proper education facilities in connection with our agricultural development. Our farms are laid out, owing to our system of survey, remote one from the other—there is no effort to have them radiating towards centres where some sort of community life can be created, with the result that on the Western prairies you have women eating their heart out because of the loneliness and men fighting against conditions because they have no social intercourse. You have tremendous difficulties created in connection with education, etc. We want to plan our agricultural districts so that there should be that community life taken to the prairie, and to Northern Ontario.

I have another point which shows you how comprehensive that question of Town Planning is. We want to plan for a healthier Canada, whether in the city, in the town, in the village, or on the farm, and if we want to take people back to the land we have got to take some of the town facilities, some of the town interests with these people, if we want to keep them there. This touches us very intimately in connection with the question which is outside of my subject, and that is when we come to deal with the increased immigration, with the returned soldiers and with the people who are coming back to us with small incomes, we will have an opportunity of creating colonies for these men to get back to the land, but we will not succeed in attracting them back to the isolated farm country, cut off from social communication with their fellows and cut off from all markets where they can get rid of their products in an economical way. We must endeavor to apply to our agricultural areas some principle of development which will enable us to make the agricultural life as interesting and as socially attractive to them as we can, and it certainly means that we ought to apply every possible amount of intelligence to that problem in the future. I mention this because it is one of the phases of national life at the moment, which has a peculiar interest to all of us who are interested in the struggle in which we are engaged.

Now, before putting some of the illustrations which I have on the screen. I should like to impress once more the comprehensive character of this subject. I mention that the subject covers all phases of community life, and I would like to indicate to you the different aspects of community life which constitute the basis on which the town and the city exist and which show us what we have to deal with when we come to plan.

In the first place, whether it is the large city or the town, industry must be the first consideration. We have to plan our great city so that great industries can be carried on with such facility and with such advantages as to enable us to compete in the markets of the world. We don't do that at present. We dump our industries here and there without proper regard to the man, without proper regard to the transportation. In our smaller towns we do not have the quality of street that we might have to enable transportation to be carried on on our roads as well as it should be. Some of our streets are as deep as they are wide, and some of our manufacturers have great difficulty in getting to and fro. We want to plan on lines which will enable the smaller towns to carry on with greater economy their street improvements, and in connection with our villages and our provinces as a whole we need to consider this question of good roads. I will later touch on how this bears on gardening.

Then there is the question of living conditions of the people. We are becoming more and more convinced that there can be no satisfactory home life for our social conditions to divorce the people from nature; there can be no satisfactory home life in the tenement if the people who live and work in the city have no means of coming in contact with mother nature. It is a sort of compromise, a sort of means of existence in the midst of conditions which are beyond their control, but it is not the sort of home life, the kind of home life we want to aim at. However difficult it may be to obtain in practice, it will give us the combined home, the combined fireside, the affections of the family coupled with the beauty of nature outside, and the home life which will represent the castle of the family as distinct from the general community life as a whole. That is the aim which we ought to try and rise to. The family is the unit of the city rather than the individual, and our aim is to try and reach the stage where each individual family can have a garden their own, which they can have under proper conditions.

Now, I have mentioned living conditions and industries. There is also the question of recreation and education. How intimately these are associated. How much more interesting our children's playgrounds could be made with a little garden! How much do we want to cultivate that love of the beautiful. that love of natural things among the children! How little do we really do in that connection! I spent part of the day in visiting the new technical school in Toronto. I asked the question, and was disappointed to hear that Natural History and Horticulture had no connection with that institution. That school was a disappointment to me from another standpoint, that is the surroundings among which it stands. To find a building which cost such a large sum of money in the planning of which no garden architect had any part seems like a part of the building is lacking. This applies to all our public buildings. there seems to be so little effort employed to let nature beautify them. Large sums of money are spent on buildings situated on crowded streets, without the garnishing which nature adds. We find these beautiful buildings erected at a great cost without the surroundings which we as gardeners would like to see.

Now, I do not want to speak on this subject from a sentimental point of view, because I think we can persuade ourselves that these things are not only things to be loved and enjoyed in life but things that mean wealth to us from the point of dollars and cents.

Just one other aspect, and that is the civic spirit that we might impart to our people by improving the city park, and city parkways connected with our community life as a whole. There are the two main aspects, the public street and the public buildings, the gardening connected with these things. And then there is the home gardening. These are the two aspects we want to keep in mind. Gardening in relation to administrative buildings and in relation to our educational centres. We see some effort in this direction around our educational centres, for instance, the University of Toronto. We see the absence of this—for instance with our station, or at least we could not imagine the presence of it in relation to the great new Union Station in Toronto. Then gardening in connection with the small home, cut off from anything but an ugly little back yard and divorced entirely from nature except such as can be reached by a long walk or a trolley ride—the garden attached to the small suburban home and the garden which has come to be fashionable, the beautiful gardens which surround the homes away out ten or fifteen miles at Port Credit. People who love gardens have to go ten and twelve miles away in order to cultivate them to advantage and to get the beauty which they desire, and that is because of speculative interests in our lands to which I will refer later.

I just wanted to refer to the general introduction of this comprehensive subject and to the community life as a whole, and the individual life in the home. We see then this is really a social question as well as one of personal interest to us in connection with our home life, and I hope I will be able to demonstrate that more clearly as I go along.

ILLUSTRATIONS SHOWN ON SCREEN.

Illustrations showing Princess Street Gardens in the City of Edinburgh, Scotland, the city garden as distinct from the home garden, the City of Edinburgh showing the monument of Robert Burns, and the station in the midst of extensive gardens. Edinburgh planned in the seventeenth century, Toronto built up in 1834, showing marked contrast between a planned city and one built helter skelter.

Illustrating new cities in the West, showing the sky scraper in all its unloveliness. From our point of view there is something very depressing in the sky scraper—you have it here in Winnipeg in the midst of the great prairies where land is so scarce! we can't get enough to put up our buildings on and have to erect the big sky scrapers, side by side with vacant lots. The same with Toronto. True, you have the University gardens, but even these buildings are approached by that magnificent boulevard called Teraulay Street! I venture that as one of the reasons why Teraulay Street is, is due to the fact that for the next twelve years the whole demand for office accommodation in this city has been accounted for owing to the sky scrapers that have been erected, consequently instead of developing outwards you develop upwards. There is one economical result—the fact is used as an argument why you should pay high taxes on that, because that building has doubled and trebled the value of its ground, the surrounding ground taxed just as high, notwithstanding the fact that that building has destroyed the market for the surrounding property.

Fine building in Ottawa—facing the Parliament Buildings. You look down upon this from the Parliament Buildings. The gardeners and architects joined together and made a very nice site and nice approach to that building, and then someone erected a skyscraper on the other side. There is a water tank. I don't know whether it is is supposed to inspire the citizen with any particular feeling regarding past history or literature or art. This destroys the former building, and the whole outlook from the Parliament Buildings.

As I said, there are cases in New York where you get a sort of beauty out of these high buildings, but even the artist who regards this as a beautiful picture, especially the picture of New York as you come up the harbor, cannot but acknowledge the fact that you have to look behind the building for the soul of the city which lives in that crowded place, and there people have to work and exist with artificial light day by day and night by night, and all the close contact with nature which is so essential to a healthy life is lost to them, because of the crowded way in which the city is built. I think there are aspects of this question which we should bear in mind.

View of Cheltenham in England, showing how trees were protected in building its main shop street. I want to show just a few illustrations to show how business streets can be made beautiful. These large residences in the centre of Cheltenham can only be retained as residences, because of the charm of that street. On the other side there are the principal shops of Cheltenham. Cheltenham has 70,000 inhabitants. If you walk along that street you will find beds of carnations and roses in the summertime, and trees.

Civic Improvement in St. Thomas.

The same is the case with Edinburgh, the principal business centre of Edinburgh on one side and the great public gardens on the other. There is no reason why you should plan your business centre as you do at present without regard to beauty and nature.

Berlin, even the Germans with their claim to great intellectual attainments rather than to the beautiful, which are associated with social developments, make an attempt to make their streets beautiful by planting trees, and beds of flowers. Now that is very nice, and sometimes it is carried to extremes by hanging festoons of flowers from lamp-post to lamp-post, and one would imagine that that sort of thing would be rather too expensive, but it is done in Germany because everything there is done under official domination, and yet it is a fact that that street in the last picture is cheaper than one covered over with asphalt or with macadam. The city engineer of Liverpool proved that it was cheaper to build a road of 120 feet wide than 80 feet.

In Berlin a great deal of these fine boulevards are counter-balanced by the dingy courts and the miserable homes of the people, and if the price of these fine boulevards is to be dingy living conditions for the poor, then no one wishes to advocate them. No one wants ostentatious highways and the dingy street for the people to live in.

Then, too, in regard to our water fronts. We want a little more care taken even in the centres of our cities and a little more gardening applied along the sides of our waters. Here is a view of a river front at Dusseldorf. You will see that even these Germans have done a good deal to try and improve the appearance.

This is a view taken in our own delightful Canada, showing the efforts we make to improve our river fronts. This is a dumping ground for the refuse of the City of Ottawa. This is the home of the Premier of Canada, and this is the home of the Chairman of the Local Board of Public Health. They look down on this place which is full of decomposing material. This shows you our endeavor to do things in a city like Ottawa. We do not want to spend money to get these beautiful things, but we want to use common sense. We will probably spend a lot of money to get rid of it afterwards, but we should have prevented this being placed beside the River Rideau.

Here is a view a little further north from Ottawa of the River Bonne Chere. This is one of the most charming river valleys we have. In Ontario there is an opportunity of acquiring open space, and I don't think those of us who have lived here all the time appreciate the beautiful trees, with the tints you get in the autumn, and here you have an opportunity of preserving your river banks and an open space which would be of great beauty and of great value to them as a city. I think they will likely do something in that direction, but, unfortunately, land is so scarce in Canada that it is somewhat difficult to get those who own it to give it up for such a purpose!

The River Ottawa from the driveway across to the Gatineau—a very charming piece of country, and I don't think there is anything that can surpass Ottawa as a city, and one hopes that the things that have been done in the way of disfiguration will gradually be got rid of, so that the site may be developed into a capital worthy of this great nation.

Laying out the banks of the canal, and a good deal of money has been spent in laying out pathways and gardens which help to improve the surroundings. Occasionally they make such a mess of things as you get here. I would rather have nature running wild than this great contortion of paths and roads, and one feels we want a little more intelligence applied for public gardening. One really does not like to see so much money spent and a failure made, but we should select our open spaces, leaving the beauty of nature.

Even in a little public playground for the poor at Bourneville you get a charm which is not possible in the great formal garden such as you saw in the previous picture. There are, of course, places like Washington where the formal treatment in connection with formal buildings gives us a very charming garden effect, but we want to consider not necessarily the formal treatment of gardens as suitable in all cases, but to apply our intelligence in every case and consider it on its merits.

Those who are interested in preserving natural effects in trees are sometimes called cranks, because it is assumed it is not worth anything in dollars to do it. I am showing you this view to strengthen your conviction that trees are worth money. In the City of Baltimore there is an estate called " Rowland Park " just outside the city, and they regard every tree worth $200 to $300.

And you will see them building a retaining wall in order to preserve those trees and here you see the results of that wall and the trees, and the effect it has upon the surroundings. The saving of trees is not desirable alone on account of the beauty they give us, but because they are really worth money.

The view of snow upon the trees in Canada is just as valuable as a means of educating us as in the summer.

Here at the same place in Baltimore you see the actual building of a house around a tree instead of planting trees around the house, and the efforts which are made to preserve trees from a commercial standpoint, showing us how stupid it is to go on destroying them.

I have been touching on some of the business aspects of gardening and I want to touch upon the question as it affects the social life of the people in their home, and the first question is the question of transportation. It is not very remote from that of the garden. If you want to get people to have gardens and to appreciate gardens, you must have your system of transportation so arranged that the people can be spread out over the country instead of being packed too closely together. Here is a diagram of the City of Liverpool showing the radial roads running from the centre out into the country which enables the population to circulate out through the country. This enables us to get a sufficient amount of land applied to the home to encourage gardening. Of course, people are apt to consider the cost of going to and from their homes and the time it takes as being rather too big a price for the advantage of a garden. I think that all depends on the garden.

I want to indicate to you that the finishing of streets and roads is not only a means from our standpoint as interested in gardening and in nature, but it really is a question which affects us from a financial point of view—those of us who are taxpayers. At the present time we have a by-law in Ontario which says that every street shall not be less than 66 feet wide. Now you might as well say that every garden path shall be the same width. It is the same intelligence applied to fix the width of a road, as would be applied to fix the diameter of a water main, say nine inches in every case. The width of a street ought to be whatever is required. In Birmingham they vary from fifty feet to twenty feet. We want it in Canada so that the little private home can have the private carriage way that they want, and the privacy which is really necessary to have in city home life. And you take away the dust to the main arteries where it should be. About 75 per cent. of our streets are too wide, and about 25 per cent. of them are too narrow. In order to vary the width of street you must have a minimum width between buildings. In most cases in Birmingham in future, buildings cannot be erected nearer to each other than 72 feet, notwithstanding the fact that the street is 20 feet wide. Now that means that a great deal of land which is at present wasted in streets is to be given up to gardens.

Now we see the effect of a simple form of residential street in one of the garden suburbs that I refer to in Baltimore. You get a nice front garden, a comparatively narrow street. What could be more charming! That street would not be wide enough for your factory district. Now, if you have Town Planned your cities you will have provided for this, and you can reduce the cost of your streets. You see the effect of that in one or two of the plans of Lord Salisbury's

Estate outside of Liverpool. They have a large football ground behind the houses. No street improvements have to be borne, because it is behind these houses, and the houses are all set back 70 to 80 feet. In some cases a little private road leads up to a square. Now this development means eight houses to the acre on land where formerly no less than forty houses to the acre would be effected.

This garden shows our ordinary method of development and what might be done under better conditions. We proceed at the present time by straight lines for streets, with comparatively small gardens.

This one shows 340 houses. The cost of the roads in this case was £9,947, the average size of the plot is 83 square yards. Now we have a more open system of development and there are only 143 houses, the average size plot is 261 yards as against 80, but the cost of roads is only £4,480. In other words, the cost of roads is half as against the other case. But the cost of land in each case is the same. We did not get away from that, although there is a point there which is very important. In my past experience I had to advise some landowners in the old country on a sale. I persuaded them that it would be better to sell from 25 to 50 per cent. cheaper, because they would sell so much more quickly, and the land would turn over quicker, as the compound interest makes up for the difference. That would apply all around Toronto. There are thousands of acres of land, that if the owner of that land had sold five years ago at from 25 to 50 per cent. less he would have been better off than holding at the high prices. Land in this country doubles itself in every ten years, and I had a case in Minneapolis where a man had paid in 1848 $1,500 for some ground. Now he said he would take $5,000, and I estimated what that land cost him. It had cost him $25,000 because of the compound interest.

But the point that is of real interest to us is that whereas this man for a total cost of 8d.—16 cents—a week gets the large amount of garden shown here, this man for 22 cents as against 16 cents, gets three times as much land. In other words, for 22 cents you get three times as much land, you pay a little more and you get much more land, the reason being the saving in roads.

This plan shows us a plan prepared for a private estate in England, where they had the main arteries 70 to 80 feet wide and the little roads 30 feet wide running through the woods. Instead of running straight roads, we ran little drives through in between the trees, preserving the trees, and we got one-quarter acre plots to each house instead of one-eighth, because the street improvement was reduced.

Garden scheme in Thorncroft Lane, showing how to use a large amount of frontage. Behind houses there are vegetable gardens, behind that there is a large playground for the children, then there are pathways running across this triangle. Those who wished extra gardening space could get an allotment by paying about 12 cents a week. A man has a lawn tennis court in front of his house in common with nine families, behind he has his vegetable garden, beyond that he has the playground for his children. In that way you can develop in triangular in a much more interesting way than you can in rectangular blocks. That is within two miles of a city of 20,000 inhabitants, where ground costs $1,200 an acre with all the local improvements put in, as against probably $5,000 or $6,000 which you have to pay in similar position in some of our towns here.

Showing Hampstead Gardens. I am showing you these views of English garden suburbs because there is no place where this is carried out like it is in England, and we want in Canada to see how we can develop to the best advantage.

Birds' eye view which shows interesting character in the small class of house just being erected, and in the next view the little narrow roadway which is regarded as being sufficient. You don't get the paved street, but the straight asphalt road.

You see in the next view a photograph I took in Quebec for the purpose of showing a street 14 feet wide. Even where you want to curb it, there is no reason why a street like that should not be sufficiently wide in residential neighborhoods. Now, at present we have to make all our streets the one width because we do not plan our towns, and we cannot get the effect as we have it in the Garden City in Letchworth. The houses are set back behind a large playground. They have to walk back in order to get to their houses, but they get away from the motor dust. These small houses rent at about $6 a month, and to show what can be done in the way of encouraging gardening among poor people, we want to realize the advantage of encouraging Horticulture among the poor, and we see here how the poor people from the very heart of London, who have never seen gardens, have been attracted out to Letchworth, and they take to the spade as a duck takes to the water, and they soon realize the advantage of the garden as a means of making home life more attractive.

Barnsdale Boulevard, Hamilton.

In the City of York. Take here the kind of streets and the kind of houses in which the people live. Now they are laying out these little gardens with little small houses for the very poor people. You cannot do that with 66 foot streets and all the necessaries of modern civilization which we understand. You can only do it if you accommodate the cost of our street improvement to the class of house that street contains. These big gardens were built the second year after these working men had moved out from the midst of a city.

Now as to gardening in Canada as compared with England. I would like gardening here because the growth is so rapid that it is so much more interesting. You can grow roses, true, like they can in England, but you can grow many things more cheaply than in England. It is merely a case of developing the gardening instinct in this country, and I think we can in Canada have as successful gardens attached to the homes of the working classes as anywhere else.

Town planning scheme, Ruslip, Northwood, planned 100 years in advance, 128 acres. They have building lines 15 to 35 feet back from the street. It means that they have been able to preserve trees, so that all the timber on 5,900 acres will be preserved without any loss to anyone.

Other advantages from the point of view of gardening. Formerly you could put 30 to 40 houses on the acre to that land, now by a land Act no more than four can be put on that part, no more than six to that part, no more than eight to that part, no more than twelve to the acre on that part. The result of that is that you prevent the possibility of slums and you give everybody a garden. Now the encouragement thus given to the development of gardening within fifteen miles of the centre of London is here illustrated. This is a sort of bird's eye view of what it will be like when developed.

Now here is a diagram to remove the fallacy of "If you spread your cities too wide out, how are you going to get people to and from work?" As a matter of fact, Toronto covers as large an area as some of the cities with fewer houses to the acre because of the waste. You get large cities growing out in patches. This diagram illustrates this point. Whereas you can accommodate only 160,000 people in that small circle, if you go out only five miles you can accommodate twice as many people, that is to say as you develop along the radius, your circle becomes very much wider. Between this circle and that point is 1½ miles and that point and circle, three miles. Now the distance between 1½ and 3 is very much smaller. In other words, as your city grows and your circumference increases, your area extends.

We proceed in building cities by calling attention to conversion of peaceful farms to new and thriving Pittsburg. In this advertisement it says, "No longer will Canada point to Saskatoon—Ojibway will be the centre of attraction." Now the real estate question is one that really affects the interests of those who want to get a healthy development, who want to encourage gardening. You first of all get these advertisements attracting people to the investment in lands. We believe in individuals owning their own sites and we allow them to build on marshes. (Illustration.) This land was sold in lots within two miles of the centre of Ottawa. I took this photograph when there was two feet of ice underneath that house, and I had to put a plank down in order to stand and take that view. Now in order that that man can garden, he has to raise the whole of his garden three or four feet, and he has to get material for that purpose. He raises the level of the ground with dumped refuse, and yet we argue that that man must cultivate his garden.

We see Winnipeg here in 1884, and as it develops we get views such as these in the City of Toronto—places where gardening is impossible, where people's lives are neither good nor beautiful, where instead of nature and trees, we get advertisements of King Edward VII Scotch Whiskey. It is only when we want to raise pigs that we really get land in a decent place. There are cases in Canada where we may say the contrary.

Here is Mr. Whyte's garden in Ottawa. I want to see not only Mr. Whyte's daughter enjoying beautiful gardens, but daughters of the poor as well. Mr. Spencer, I believe, is the owner of a house in Ottawa which is very attractively laid out. I am showing you what kind of citizens of Ottawa these men are, and they are showing how we may have our front gardens, and also how we ought to keep our back gardens. I have visited back gardens in Ottawa which are attached to houses, and they are so untidy about the beginning of October. I asked them why they did not clean them up, and was answered. "Oh the snow will soon be here and cover it all up." I went to one house which was to be rented furnished for $125 a month, but when I saw the back garden, even though the price had been within range for my purpose, I would have had no wish to live there.

Now the half of the value of a house is in the garden, and we want to educate the people as a whole to this effect. Even out in the prairie you get some farmers who take a delight in their gardens, and you want to encourage the farmers to get their homesteads as attractive as this one is. How often we see farms without any attractive buildings, where there are no shrubs or hedges of any description. People say it is almost impossible to grow hedges on the prairie. These hedges were grown within the last few years, and we can carry this garden into our agricultural planning, even to the extent of encouraging intensive cultivation in the field. Here is a large farmer's garden cultivated by the plow, and we want to encourage more of that. If we don't do it for the sake of the old folks, we should do it for the sake of the children.

And we want to make the child's playground interesting as well as useful. Here you see them away in the northern part of Sweden collecting wild flowers in the woods. One of the great things we have here in Canada are our wild flowers. Our children want from us the lead in the matter of loving art and loving the beautiful. I was told that the erection of the Technical School in Toronto was regarded as an extravagance, and yet before the school properly opened there was a waiting list of a large number for the arts which are taught there. There are, I think, 1,700 day students in that school, 4,000 night students all learning some art, and all these 5,000 girls and boys going out into Toronto homes will inculcate the spirit which is taught to them by their masters in that great school. Now we want to get the young people loving art and beauty for its own sake, but not for that alone, so that they may make art and beauty the parent of virtue, and unless the little ones grow up to love the beautiful things we will never be able to raise a healthy citizenship and build up a great nation.

I showed a picture of Edinburgh showing the statue of Robert Burns. He made use of a sentiment which I think we ought always to bear in mind, and that is that we really want to get down to the question of the home, when we are considering the question of family life, "To make the happy fireside bright."

And we also want the little garden around the home, and the beauties of nature around our cities, and even with our cosmopolitan population, as we have all over Canada, we will be able to inculcate ideas of beauty and enable us to have a noble manhood and womanhood in this great Dominion.

After speaking a few words of deep appreciation of Professor Adams' lecture and illustrations, the Chairman called on Mr. Frank Yeigh for his views on the part Canadians were playing in the great overseas drama of war.

The election of officers resulted as on page 6.

THE HISTORY, DEVELOPMENT AND PROPAGATION OF THE LILAC.

JOHN DUNBAR, ASSISTANT SUPERINTENDENT OF PARKS, ROCHESTER, N.Y.

The lilac seems a very common and stale subject to talk about, nevertheless, it interests a great many people in Canada and the United States. About five or six months ago I received a postal card from a Japanese near Tokio, Japan. It was the ordinary size of postal card, but it was written in very, very fine writing, perfectly legible. I was astonished to see how much could be put upon a postcard. He began in this way: "I am very much interested in reading an address printed in the annual report of the Horticultural Association of Ontario, Canada, delivered by you before the Association." I could not think for the moment what he was referring to, and then I remembered my address before your Association a year ago. I could not think of the subject, but it was something along the lines of the educational features of the public parks. He then asked me questions about Horticultural Statistics in the United States, about the Rochester Park, about the Horticultural Library of that country, and for some literature to be forwarded to him. What I was very much interested in was the fact that your literature seemed to be pretty well disseminated around the globe.

The lilac, *Syringa vulgaris,* is the queen of hardy garden shrubs. No other garden shrub approaches it in popularity. The showy, prominent, flagrant flower clusters which are always produced abundantly, its adaptability to adverse soils, provided they are well drained, and its absolute hardihood, all these qualities combine to make it a popular favorite. It appears to flower much more abundantly in the gardens and parks of the north and north-eastern United States and Canada than it does in Europe. The result of this is seen in the remarkable popularity the lilac has attained, judging by the enormous multitude of people that go to see different public collections of lilacs in flower in this country.

The home of the common lilac is supposed to be in the mountains of south-east Europe, and along the rocky banks of the Danube. About ten years since it was found growing on the higher mountains of Bulgaria, and it had all the appearance of being there in native conditions. Seedlings raised from seed collected from these plants on the Bulgarian mountains show primitive conditions in flower. That is, in the small individual flowers, and small clusters, there are all the appearances of a wild type.

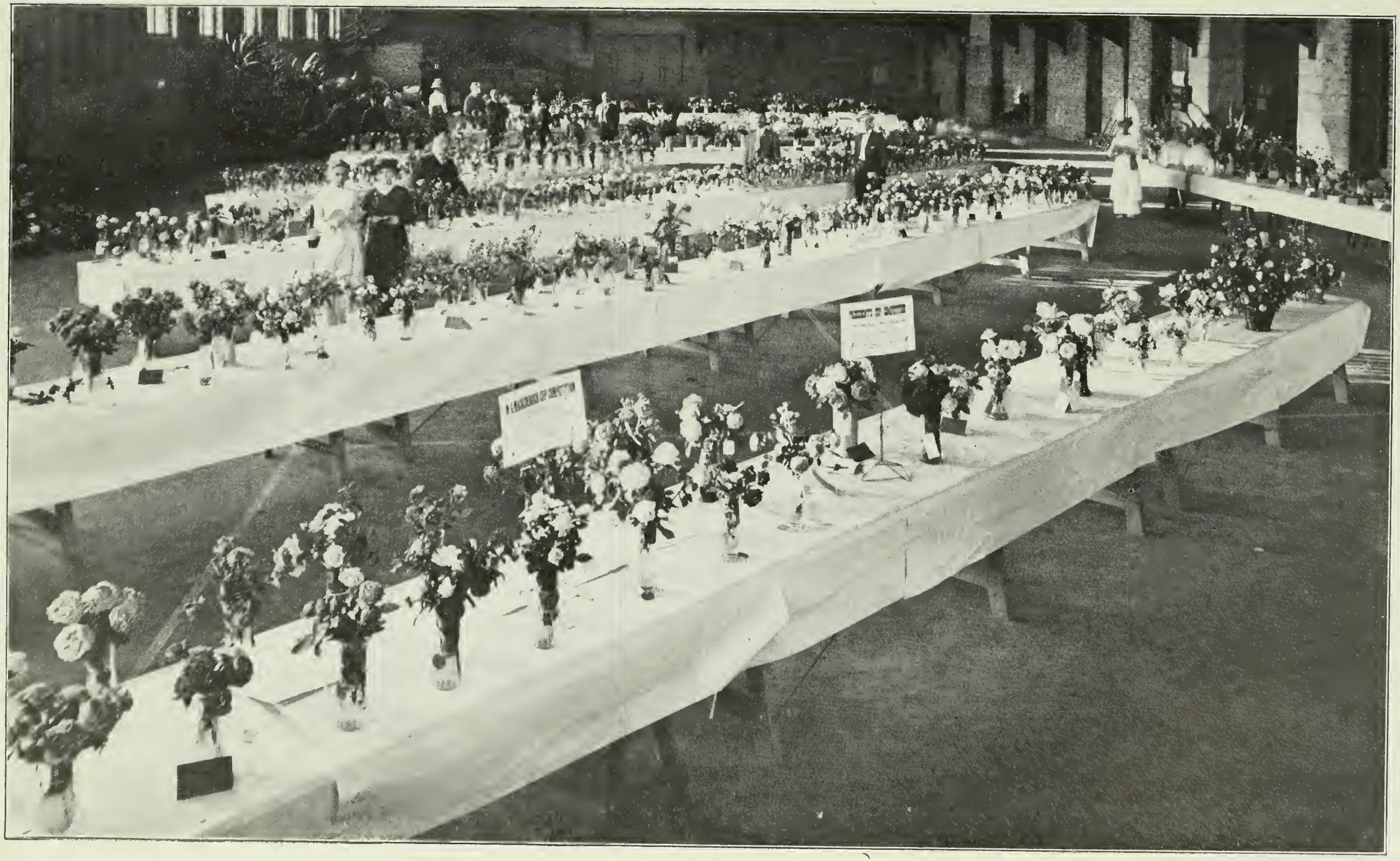
It is said to have been introduced into the gardens of Great Britain about 1597. Loudon, in his *Arboretum et Fruticetum Britannicum,* published in 1842, gives descriptions of seven varieties, and states: "A number of plants have been raised from seed by Mr. Williams, of Pitmaston, of which there are six sorts tolerably distinct in the Horticultural Society's Garden. The French nurserymen are also in possession of new seedlings, but none of them that we have seen are so well deserving of culture as the common blue, the violet, the red, and the white." This then was about the status of the lilac in Europe about seventy years since. During the previous nearly two hundred and fifty years of its cultivation in British gardens nothing particularly noticeable in the improvement of the lilac seems to have been accomplished, at least so far as any records show.

There are some excellent varieties of the common lilac that have been in cultivation in American nurseries and gardens for twenty-five to thirty years, and they, probably, appeared in Europe forty years since, but I cannot find any record of their first appearance in cultivation, or the sources from which they came. Jacques

Callot is one of them, and has single, silvery lilac flowers about one inch in diameter, and is a most beautiful variety. Aline Mocquery, sometimes spelled Mocqueris, has single, bright, purplish-red flowers, and is a most free bloomer and an excellent red-flowering form. Judging by the names these two are of French origin. Dr. Lindley has single flowers distinguished by a deep red bud when opening, which fades to a deep dark lilac later, a most beautiful lilac and probably of British origin; Louis Van Houtte has single flowers and might be described as light violet red, changing to very dark lilac, a very ornamental variety and likely originated in Holland. There are a number of others of uncertain origin, but we mention the above four because of their meritorious qualities.

Over thirty years since, Ellwanger and Barry, of Rochester, N.Y., purchased the stock of three varieties of lilacs from James Dougall, Windsor, Ontario. I understand that these were raised by Mr. Dougall, and were named Princess Alexandra, Prince of Wales, and Albert the Good. Albert the Good has single deep-purple-red flowers, and perhaps was the best lilac raised in that color until Ludwig Spath appeared. Albert the Good has always been a shy bloomer and has a very poor constitution. Prince of Wales was only remarkable for its peculiarly twisted petals, and, outside that, has nothing to recommend it. Princess Alexandra was by far the best of the trio, and with its upright, bold, compound single white clusters of flowers, is to-day one of the best of the single white-flowering lilacs.

The development of the most beautiful and showy lilacs we have in gardens and parks to-day commenced about forty years since in the nursery of Victor Lemoine, of Nancy, France. A very odd variety of the common lilac has existed for many years in European gardens, and it is in the collection at Rochester, known under the name of Azurea plena. It produces small clusters of bluish double flowers. It is somewhat of a curiosity, but has no ornamental value as the small flowers are usually hidden by the leaves. The flowers have no stamens and the pistils are either abortive or so hidden amongst the corolla lobes as to be beyond the reach of insects, and therefore it does not produce seeds naturally. To produce seeds it must have artificial aid. About forty years since, Victor Lemoine took some of the best varieties at that time, such as Ville de Troyes and Sanguinea, and the Chinese species Syringa oblata, which he used as pollen parents and fertilized the few pistils he was able to find on Azurea plena. Amongst the seedlings raised from this cross was one that was intermediate between Azurea plena and Syringa oblata, which he named Hyacinthiflora plena. This has very early flowers and the foliage turns reddish in the fall like the pistillate parent. Lemoinei fl. pl. was another double variety he named, with lilac blue flowers, amongst these seedlings. Other varieties amongst these seedlings that were named were Renoncule, Rubella plena, Mathieu de Dombasle, and Le Gaulois. Victor Lemoine discarded Azurea plena as a seed parent and used the new double varieties he obtained as seed-bearers. The best single-flowered varieties were again used as pollen parents. From this second cross a new set of seedlings was obtained, and amongst them were some beautiful forms. Alphonse Lavalle, Michael Buckner, President Grevy, Pyramidal, Maxime Cornu, etc., were some of those named in the second group of seedlings. Alphonse Lavalle and President Grevy are still standard varieties at the present time. This, then, represents the start, break, or beginning of the numerous varieties of lilacs of the present day in our parks and gardens. A few years since the Lemoines introduced a distinct race of lilacs by crossing the early flowering lilac from Northern China, Syringa Giraldi, with some of the earlier forms of the common lilac. The progeny resulting from this cross were intermediate between the parents in characters, and are beautiful, early-flowering lilacs. Lamartine and



Rose Exhibition, St. Catharines Horticultural Society, 1915.

Mirabeau are single-flowering forms; Berreyer and Vauban are double-flowering varieties, and they show various shades of rosy-mauve and rosy-lilac. The above four were the results of this cross. Victor Lemoine brought out new varieties until his death, and the firm still appears to be keeping up the good work. The Lemoines have done more for the improvement of the common lilac than any other firm or individuals in the world.

About eight years since, I sowed the seeds of some good single flowering lilacs, such as Virginalis, white; Princess Alexandra, white; Marie Legraye, white; President Massant, purple red; Aline Mocquery, deep purple red; Scipion Cochet, violet purple red. These have all flowered during the past two or three years. There was no artificial fertilization of the flowers. No doubt a good deal of that must have occurred haphazard in a collection of nearly three hundred varieties. It may appear strange that out of one hundred and fifty seedlings of Marie Legraye, white, only two or three occurred with white flowers, and these blossoms were miserably small and showed no character. One good seedling, with semi-double, reddish lilac flowers appeared, and two or three others of rich lilac shades that seem to be worth preserving. The best varieties came from the dark-flowered kinds. One seedling from Aline Mocquery was semi-double, with almost maroon flowers. Two other seedlings with semi-double to double flowers, bluish-lavender shading to a tinge of reddish-lavender were detected. A few good single reddish-flowered varieties with compact habit, appeared to be worth saving. From Virginalis, white, I procured a good seedling with single bright porcelain-blue flowers, and from Princess Alexandra a good double white was procured. A few good forms were procured from President Massant and Scipion Cochet. We may, perhaps, name some of them, but if not we will grow them under seedling numbers. Aline Mocquery appeared to be superior to the others in producing good progeny. A large number of the seedlings, however, were worthless and were destroyed.

There are about twenty-five species of lilacs known to science at the present time. A number of new species were discovered since the past fourteen years in Western China by the Chinese botanist and explorer, E. H. Wilson. The range of all of the species of the genus is from south and south-eastern Europe through central Asia and the Himalayas to Mongolia, Northern and Western China, and Japan. It may appear remarkable that no species of lilac has ever been found native on this continent.

Some of the species are remarkably handsome garden plants, and all of them are worthy of cultivation. Syringa Amurensis, from Manchuria, has large white, fragrant, loose clusters of showy flowers about the middle of June. It has very slender branches and grows eight to ten feet high. Syringa chinensis was supposed at one time to be a species, but is now known to be a hybrid between the common and Persian lilacs, and originated at Rouen, France, many years since, and is sometimes known as the Rouen lilac. It has large, lax flower clusters and varies from deep lilac, reddish lilac, to white. Syringa Giraldi comes from Northern China and has pale lavender flowers in long clusters, at the end of April and the first of May. It grows six to eight feet tall. Syringa Persica, Persian Lilac, comes from Persia and Afghanistan, and is a most dainty, beautiful shrub, with flowers lilac and white. Syringa pubescens comes from Northern China, and has loose clusters of pale rose-colored, fragrant flowers, at the end of May. This is a most beautiful shrub and grows six to eight feet high. Syringa reflexa is one of the new lilacs from Western China, and flowered with us last spring for the first time. It has curving panicles of rosy-red flowers and is most distinct and pretty. Syringa

Sweginzowii is a new lilac from some part of Eastern Asia, with dainty clusters of white flowers shading to pink, and flowered with us for the first time last spring. Syringa villosa is another lilac from Northern China, and grows wild in the neighborhood of Pekin. It is one of the handsomest of the species and produces erect, showy clusters of pale, rose-colored flowers during the first week in June. The foliage is beautiful and characteristic. Syringa japonica is from Japan, and approaches more nearly to the size of a tree than any other lilac. It has enormous, white flower clusters about the end of June, and is the latest of all lilacs to flower. Syringa oblata comes from Northern China and is about the earliest of the lilacs to bloom, and is sometimes in flower about April 26th. It is the only one that has handsomely colored foliage in the fall, and turns to a deep scarlet-red. Syringa Wolfii is another new lilac from Western China, and flowered with us for the first time last spring, and is of a deep shade of lilac, with flowers produced in great profusion.

All of the species of lilacs can be easily raised from seed, which should be sowed as soon as ripe. Varieties can be budded, grafted, raised from green cuttings, layers, or suckers (provided the suckers are taken from varieties that are upon their own roots). It is always preferable to have varieties upon their own roots, but they are usually hard to obtain. Green cuttings should be taken as soon as the wood has made its full growth, about the first or second week in June, and placed in four to five inches of sharp sand in a hot-bed in which sufficient stable manure has been packed to create good bottom heat. The sashes should be kept closed for several weeks and shaded from sunshine at all times of the day by cotton-cloth three feet away from the glass. The cuttings should never be allowed to become dry. They should be well-rooted by August or September, and they can either be potted and kept in a cool greenhouse or planted in a frame and protected throughout the first winter. The next best method of propagation is to wedge graft on the roots of the California Privet, using two-year-old privet stock; the roots need not be more than three inches long. This should be done about the first of February. The grafts should be placed in "flats" about four inches deep, deep enough for the unions to be covered with soil. If the "flats" are placed on a greenhouse bench with bottom heat and a moderate temperature overhead, not to exceed fifty-five to sixty degrees, they will soon unite and root. They can be planted out in the nursery about the middle of May. If this stock is planted sufficiently deep it invariably gets on its own roots, and the privet ultimately disappears and dies. Budding on to the California Privet is often practised in many nurseries. They grow with tremendous vigour for a few years, but according to our observations they are short-lived. Budding on to the common lilac stock is often resorted to, but in this case there has been a constant repression of suckers, and if ordinary vigilance is neglected the graft will soon be overpowered. Layering is an easy method, but requires patience. This should be done in spring, and it takes about two years before the layer is fit to be disturbed.

A selection of the most distinct varieties of lilacs, including some of the newer ones and some older standard kinds would be as follows: Single-flowered, in shades of purple-red, violet-red, and carmine-red; Danton, Cavour, Pasteur, Milton, Reaumur, Negro, Congo, Toussaint L'Overture, and Uncle Tom. Single-flowered, in shades of blue to bluish-mauve; Beautre, Gilbert, Crampel, Cœrulea superba, and Colmariensis. Single-flowered, in shades of bright lilac-pink; macrostachia, lilarosa, amœna, Schermerhornii, and Lovaniensis. Single-flowered, white; Vestale, Madame Florent Stepman, Virginalis, Kate Harlin, Princess Alexandra, Marie LeGraye, and Frau Bertha Damman. Double-flowered, in shades of purple-red, violet-red, and carmine-red; Charles Joly, Paul Hariot, Stadtgartner Rothpletz, De Saussure, La Tour d' Auvergne, and Marechal de Bassompiere. Double-flowered, in shades of blue to bluish-mauve; Marc Micheli, Maurice de Vilmorin, President Viger, Condorcet, Godroy, Viviand Morel, Abel Carriere, Olivier de Serres, and Victor Lemoine. Double-flowered, in shades of light pink; Louis Henry, Edouard Andre, Comte de Kerchove, Waldeck Rosseau, and Madame Jules Finger. Double-flowered white; Madame Lemoine, Miss Ellen Willmott, Jeanne d'Arc, Dame Blanche, Obelisque, Madame de Miller, and Madame Casimir Perier.

Arrangements were made for an excursion to Rochester on May 24th, to visit Highland Park.

PROF. MACOUN: Mr. Dunbar's paper is a very complete one. All should try and grow more lilacs than we have been doing in the past. It is one of the easiest shrubs to grow, and every garden should have some of those newer varieties spoken of by Mr. Dunbar. Some of our bushes are twenty-five years of age, among which are some of Lemoine's Hybrids. There are a great many beautiful varieties, but you can get all the combinations of shapes and colours in fifteen or twenty. In speaking of the hardiness of the lilac, it is very interesting to know that we are growing lilacs now a little more than 1,000 miles north of Toronto, in the Peace River District. For one travelling from Eastern to Western Canada, it is most interesting to find the long range of the lilac season in Canada. I was, for instance, in Vancouver Island early in April, where you get lilacs in bloom then, and in Prince Edward Island, on the 21st of July, the Common Lilac was still in bloom and the Japanese Lilac was still in buds, so that we have a lilac season in Canada from early April until August.

Mr. Dunbar referred to the propagation of lilacs on the California privet. That may be all right in the vicinity of Toronto and the milder climate, but we had a large collection of lilacs which were propagated on the privet which were winter killed, because the California privet kills out at Ottawa, so that anyone buying lilacs to be propagated in the colder parts, should avoid any chance of failure, and I think it would be better to use the Amur privet. It is not as vigorous a grower as the California, but we have some in Ottawa and they are doing very well. It is certainly desirable to propagate lilacs on the privet, provided it is hardy enough. We find that our older lilacs are getting weaker every year. In pruning one naturally cuts away all the suckers, and, when they are propagated on the lilac, if you cut away all the suckers, the plant gets weaker every year. I have propagated on the privet by planting the lilac deep; you get it on its own roots, and then you can prune the same.

A MEMBER: Mr. Dunbar, has the Princess Alexandra any perfume?

JNO. DUNBAR: Very little.

A MEMBER: Where can the Princess Alexandra Lilac be bought?

JNO. DUNBAR: From Ellwanger & Barry, Rochester.

MRS. CADWELL: What kind of lilac would be best to use for backyard hedges?

JNO. DUNBAR: Just the common purple lilac.

A MEMBER: Does the Persian Lilac ever grow more than three to five feet high?

JNO. DUNBAR: It gets to five feet sometimes, never over six.

PROF. MACOUN: Four or five feet is the limit; it kills out in the colder parts of Ontario.

A MEMBER: Does white Japanese Lilac grow in tree form?

JNO. DUNBAR: Yes.

JNO. DUNBAR: Another name for the Rotho Magensis is the Rouen Lilac, the large Persian Lilac as distinguished from the small Persian one. The correct name of the Rotho Magensis is the Syringa Chinensis. Has anyone ever raised a lilac from hard wood cutting? I have tried it time and again, but I never yet have succeeded in raising a lilac in this way. The late Prof. Jno. A. Carroll, Buffalo, who died last spring, use to propagate a few of them.

A hearty vote of thanks was tendered to Mr. Dunbar for his excellent paper.

COMMON SENSE IN CITY BEAUTIFYING.

G. WRAY LEMON, SECRETARY, CHAMBER OF COMMERCE, OIL CITY, PA.

Mr. Watrous, Secretary of the American Civic Association, called me by telephone from Washington, D.C., and asked me to come to Toronto on Wednesday and Thursday. I could not be here yesterday, and I find that I missed a splendid address by Professor Adams on "Town Planning." As I spent two years as secretary of the City Planning Commission at Calgary, Alberta, I feel that I missed a great deal by not hearing this address.

Perhaps even Mr. Watrous hardly knew why he picked me to come here bearing the greetings of the American Civic Association to this body. I do not know that he knows that I was born in Canada. I have a mother living in Toronto, and she likes your city so well that I find it exceedingly hard to persuade her that she ought to come and live with me on the other side of the border. Another thing puzzles me. Why am I sent to you when Mr. Wilson, your Secretary, and Rev. Mr. Scott, are both members of the Executive Board of the American Civic Association? Bringing greetings to you seems almost like bringing coals to Newcastle.

The American Civic Association is, in some respects, an international body, and I should not be surprised to see its name changed some day. I look to see that Association holding a session over here. I would not be surprised, either, if the National Association of City Planning did likewise. I am not authorized to say this at all—it is just an idea of my own. Anyway, there are two Canadians now serving on the executive board of the American Civic Association. I do not know that there is a civic body in America better known or more serviceable than the American Civic Association. When I became secretary of the City Planning Commission in Calgary, I wanted some information quickly. We were having trouble with billboards. These were disfiguring some of our principal corners and some of our best buildings, and I wanted to know what could be done to keep these boards away from our public buildings and the entrances to our parks. I sent a night lettergram to the American Civic Association, and, although we were not members of that body, I received within five days a budget of data which took me days to go through, covering the subject from beginning to end. When I went to Oil City, I got mixed up with the smoke nuisance problem, and again I sought the assistance of Mr. Watrous. Once more I received some valuable help. Of course, we paid for the pamphlets sent us; but the thing is this: you get prompt attention and what they send you is official. Apparently every request is very carefully answered by some one who knows. I am giving you these instances to show you that if you are up against any problem whatever and will wire or write the American Civic Association, they will help you out whether you are a member or not. I showed our people in Oil City that we ought to be members, and we are now affiliated.

I would like to say a few words which, perhaps, may prove helpful to you from the practical standpoint. I am interested in city beautifying and city development, and I would like to give you a few ideas gleaned from a talk given by Henry Turner Bailey, the well known artist and lecturer of Boston, Mass., at a luncheon meeting recently in Oil City. He said that we should always remember in city improvement work that praise will do a lot more than censure. He suggested that the nicest embossed stationery should be selected by a horticultural society or a civic improvement club, and that personal letters should be written on this stationery to the men in the town or city who have done well with their lawns and gardens. Tell them that you are pleased that the town contains a citizen who takes such pride in his home surroundings, and that you want him to know that he is helping to beautify the town and make it known as a fine place to live in. Now, as Mr. Bailey remarked, those letters are never shown to anybody! Of course, they are passed from man to man and the citizen on Cherry Street who did not get one of those letters is going to get one next year—at least he is going to work hard for one. Here is another suggestion: have an exhibit of photographs of both beautiful and ugly subjects. Most of our photographs show only beautiful things. Out there in your hall among the exhibits of St. Thomas, Ont., is a very nice picture showing what can be done to brighten up a neglected corner of an office building. But what I would like to see is a picture alongside of that one, showing how the building looked before the flowers were put there.

Photo. by Geo. Baldwin.

Tasteful Decoration of Home.

You will find that most people will appreciate something when seeing it with the eye, which they never would do by simply hearing about it. In other words, whenever possible, show the bad thing as it was alongside of the good thing as it is now, so that the transformation will sink into everyone's mind. If you want something to be done to your river bank, to your bridge approach, show the situation as it is. Have a picture taken of it in all its ugliness, and then have some clever artist show what it would look like after the improvement has been made. Do everything by pictures that you possibly can—it is worth the expense. Before leaving this point, I should like to quote the following lines to you by Mr. Bailey:—

> "Little beds of flowers,
> Little coats of paint,
> Make a pleasant cottage
> Out of one that ain't."

This is not poetry: it is not even good English, but if you will impress that thought upon the minds of your school children—have them learn it by heart—I think it would have a very good influence. Sometimes you can get a little verse impressed upon people who would never read Browning.

There is just one other phase of this subject which I would like to touch on, and that is Common Sense in Beautification. There are a lot of people who get in wrong with practical, every-day business men, and you don't get them as members of your various improvement associations, and you don't get their support, because some horticulturists and city beautifiers are the most impracticable dreamers you ever heard of. They want to beautify spots in a way that will interfere with legitimate business. I think I can illustrate this. I feel sure that before this audience one does not have to apologize for anything good one may say about the Germans; I think you are all broad-minded to appreciate the good in that nation. When I was in Leipzig I saw a square in the centre of the city, which was so situated that vast numbers of people were crossing it every hour of the day. It was planted with flowers and shrubs, and it had nice curved walks and all that—no, not a bit of it! There was no grass, no flowers, no shrubs. They had it all covered over with clean gravel from curb to curb, and this raked every day. They had flowers and shrubs in many other places, but at that special spot, where people are going across at every possible angle, at every hour of the day, they used gravel. And right along this line, in how many towns and cities you see them trying to make grass grow on a narrow little strip eight or ten inches wide between the curbing and the sidewalk. You can't run a lawn mower over so small a space, and people are bound to walk on it. In so many places one sees an attempt made to have a little green grass, whereas gravel or cement would be the better and cleaner treatment of it.

In closing, may I say a word about the coming convention of the American Civic Association, which is to be held in Washington, D.C., December 28 to 31. It will meet jointly with the Pan-American Congress, which meets there to consider subjects closely related to the objects of the American Civic Association. I know that you will send official delegates to this convention, but I am hoping that some of you will go on your own account. They are to have among their distinguished guests Lord and Lady Aberdeen.

I am sorry that Mr. Watrous was unable to be here. I have tried to bring you his and the Association's greetings. We, on the other side of the border, feel that your activities in these horticultural societies are making for the betterment of every municipality in which you are at work.

Rev. A. H. Scott: As one who has been interested for a number of years with the workings of the American Civic Association, I desire to say this, bearing upon the visit of our friend from Pennsylvania. The American people with whom we have had to deal as representing the Ontario Horticultural Association have dealt very kindly with us. It was my pleasure and privilege, along with Mr. Lockie Wilson, to become members of the executive board of that Association when Ambassador Bryce was at Washington, and it is a great pleasure to look forward to that meeting again with the once Governor-General of Canada, who is to be present with his lady. I regret the absence of Mr. Watrous, the secretary, but we are pleased to welcome his substitute and representative in the person of the gentleman who has just spoken to us, and I beg to move that the best wishes of this Association be extended to the American Civic Association, and that Mr. Lemon be tendered from the Ontario Horicultural Association to-day the warmest of welcomes.

R. B. Whyte: I have very great pleasure indeed in seconding that motion. The American Civic Association and our Ottawa Society are employed in very much the same work, and we can each of us learn something from the other.

REPORT AND CONTRIBUTIONS OF THE COMMITTEE ON NAMES AND VARIETIES.

Your committee begs to make the following report and to submit for publication the following contributions from several of its members.

During the several years that it has had the honour to be entrusted with the work for which it was first appointed it has not been possible at any time to get together all the ten members forming this committee. This is due to several reasons, the chief being the impossibility of fixing upon any date when all could conveniently meet at some central place. This year the only occasion when it was possible for several members of the committee to meet was at the convention of the Canadian Horticultural Association, held at London in July last.

As in former years individual members have contributed to four distinct lines of work.

First, brief notes on newer introductions or novelties among flowers, together with notes on other flowers not yet well known in Canadian flower gardens.

Second, lists of the best varieties amongst certain groups of flowers. This year lists of the best Paeonies, of the best Irises, of the best perennial Phloxes, and of new or novel bedding plants, are contributed as part of this report.

Third, a list of popular flowers with the correct pronunciation of their names indicated by a system of accents and signs.

Fourth, a list giving the most suitable or best known common name for seventy-five of the best annual flowers.

Your committee has pleasure also in reporting that the matter of establishing a National Plant Register for the registration of new varieties or strains of plants in Canada, by those who are fortunate to originate such, has been definitely undertaken by the Canadian National Horticultural Association. That Association, however, will be glad to receive the co-operation of this Association in pushing forward such a work.

Your committee now reporting is constituted as follows: Mr. H. J. Moore, Chairman; Miss M. E. Blacklock, Mr. J. Cavers, Mr. R. Cameron, Mr. W. Hunt, Prof. L. H. Hutt, Mr. W. T. Macoun, Mr. Ed. Mepstead, Mr. Thomas Delworth, Mr. F. E. Buck.

All of which is respectfully submitted.

Signed on behalf of the committee,

H. J. Moore, *Chairman.*
F. E. Buck, *Secretary.*

NOTES ON NOVELTIES AND PLANTS NOT WELL KNOWN.

F. E. Buck, Central Experimental Farm, Ottawa.

Under this heading brief notes are given each year on a number of annual flowers which make their appearance for the first or second time in the test plots of annual flowers grown at the Central Farm at Ottawa. Several hundred varieties are grown for trial purposes. Each year all the large seedsmen offer "novelties" or new strains, and the seeds of these are obtained and the plants grown in the trial plots for comparison with the ordinary varieties. This year rather fewer than usual were of special note. Altogether about three dozen flowers, which were either novelties or only recently offered to the Canadian public, were tested. Those, however, which are not mentioned here were not considered worthy of a place amongst those which follow:—

Carnation: Improved Marguerite. Plants about 18 inches high, producing an abundance of fringed double flowers. Various colours. In bloom from August 19 till late October. Attractive in the border and most useful for table decoration.

Carnation: Perpetual Early Flowering. Very similar in most respects to the Marguerite variety mentioned above, and as highly recommended. In bloom from August 16 till late October.

Dianthus Heddewigii (*Japan Pink*). Superb single varieties. Plants 9 to 12 inches. Free flowering habit. Flowers large size, brilliantly coloured. In bloom from August 1 till late October. Useful for bedding and the flowers suitable for bouquets.

Datura chlorantha flore pleno (Datura, Horn of Plenty). Plants from 2 to 3 feet high with large leaves and making rather rank growth, with slightly fragrant yellow double trumpet shaped flowers. Rather attractive. In flower from August 20 until October 11. Useful for the border or in a position where a strong foliage plant can be used.

Datura Wrightii. This variety is much larger than the former, growing from 3 to 4 feet high. The flowers are trumpet shaped, single and pure white. A large plant with a sub-tropical appearance and can be used to advantage in the back of the border or in the centre of a bed. In bloom from July 19 until October 11.

Lobelia. During the past few years the Farm has tested about twenty-four different varieties of bedding Lobelias. Of these the following are considered the best: Ramosa (Tenuior), pale blue; height 9 to 12 inches. Ramosa (Tenuior), blue; height 9 to 12 inches. Spreading Basket; blue. Compact Lustrous, dark blue; height 6 inches. The Ramosa types are somewhat new and on account of the size of their individual flowers, together with the brilliancy of the blue, these Lobelias are very attractive strains.

Maurandya purpurea grandiflora. This is a slender climber which is very useful for window boxes, although it is frequently used for conservatory purposes. It blooms continuously, although not very profusely. In bloom from August 1 till late October.

Nycterinia selaginoides. Plants about 9 inches high, with an appearance very similar to Sweet Alyssum. Flowers borne in profusion and sweet-scented, pale blue and white in colour. In bloom from July 6 until August 22. Useful for edging, or in the front of the border.

Pentstemon, Giant Mixed Colours. Plants 1 to 2 feet high, producing long flower spikes on which are contained very attractive bell-shaped flowers of varied colours. Grown as annuals they make very useful flowers for cutting or for border effects towards the end of the season. In bloom from July 29 until late October.

Barrie Aster Show.

Sanvitalia procumbens. Plants about 6 inches high of a very spreading habit of growth, so as to form in a sandy type of soil a carpet of from two to three feet wide, which is covered with small, yellow flowers that are produced in considerable quantities during most of the summer. In bloom from June 27 until October 11. Useful for rock gardening or for edging where space is not a consideration.

Sunflower. Plants 3 to 4 feet high, of very branching character, producing a large quantity of flower heads from side branches. During the past few years several novelties have been put on the market under various horticultural names. The New Red and Unique are two of the varieties that have been tested. Grown side by side, however, there is very little difference noticed in the character of the plant, and hardly sufficient difference in the colour of the flowers to make it worth while growing more than one of these varieties. The Red Sunflower was perhaps the most attractive this year. Useful where large flowers are required and for the back of the border. In bloom from July 4 until October 11.

Thunbergia alata. Plants much used as a greenhouse climber and for suspended baskets. It does well also when grown outside. It spreads in a thick, compact mass and its canary-yellow flowers are rather attractive. In bloom from July 6 until October 11.

Zinnia, Curled and Crested, Double. Plants very similar to the ordinary well-known Zinnia. Height about 18 inches. Flowers, however, are as the name suggests, curled and crested. A novelty of the past few years, not very attractive, but still a good addition to the easily grown annuals. Colour, various. In bloom from July 1 until October 11.

Dianthus Lucifer. A novelty of 1915. Plants about 12 inches high. A very fine addition to the Japanese Pinks. Free flowering with bright scarlet flowers. Early in coming into bloom. In bloom from July 20 till late October.

AN ENGLISH NOMENCLATURE FOR POPULAR FLOWERS.

(*Revised List of Annuals.*)

F. E. BUCK, CENTRAL EXPERIMENTAL FARM, OTTAWA.

Acroclinium roseum.	Everlasting Flower.
Adonis.	Adonis Flower.
Ageratum mexicana.	Floss Flower.
Agrostemma coela rosea.	Rose of Heaven.
Alonsoa.	Mask Flower.
Alyssum.	Sweet Alyssum.
Amaranthus caudatus.	Love-lies Bleeding.
Amaranthus tricolor.	Joseph's Coat.
Arctotis grandis.	African Daisy.
Arnebia cornuta.	Prophet Flower.
Asters (see *Callistephus*).	
Antirrhinum majus.	Snapdragon.
Balsam (see *Impatiens*).	
Bartonia aurea.	Barton's Golden Flower.
Brachycome iberidifolia.	Swan River Daisy.
Browallia.	Amethyst Plant.
Cleome speciosa.	Spider Flower.
Cobaea scandens.	Cup and Saucer Vine.
Calandrinia.	Rock Purslane.
Calendula officinalis.	Pot Marigold.
Callistephus chinensis.	China Aster.
Centaurea cyanus.	Corn Flower.
Centaurea moschata or *imperialis.*	Sweet Sultan.
Chrysanthemum carinatum or *tricolor.*	Annual Chrysanthemum.
Chrysanthemum, Japanese.	Japanese Chrysanthemum.
Clarkia elegans and pulchella.	Clarkia.
Collinsia.	Collins' Flower.
Coreopsis Drummondii and tinctoria.	Annual Coreopsis (or Caliopsis).
Cosmos.	Cosmos.
Celosia cristata.	Cockscomb.

Celosia plumosa.	Feathered Cockscomb.
Datura cornucopia.	Horn of Plenty.
Datura arborea (Brugmansia).	Angel's Trumpet.
Delphinium Annual.	Larkspur.
Dianthus Annual.	Pinks.
Diascia barbarae.	Bonnet Plant.
Dimorphotheca.	Cape Daisy.
Dahlia.	Dahlia.
Eccremocarpus scaber.	Eccremocarpus.
Eschscholzia or *Eschscholtzia.*	California Poppy.
Gomphrena globosa.	Globe Amaranth.
Gaillardia pulchella.	Annual Gaillardia.
Godetia.	Godetia.
Helianthus.	Sunflower.
Helichrysum bracteatum.	Everlasting Flower.
Hunnemannia fumariaefolia.	Tulip Poppy.
Iberis umbellata.	Candytuft.
Impatiens Balsaminea.	Balsam.
Ipomoeas.	Morning Glories.
Ipomoeas Quamoclit.	Cardinal Climber.
Jacobaea elegans.	Jacobaea.
Kochia trichophila.	Summer Cypress.
Lathyrus odoratus.	Sweet Pea.
Lavatera splendens or *trimestris.*	Lavatera.
Limnanthes Douglasii.	Limnanthes.
Linaria.	Toad-flax.
Linum grandiflorum.	Scarlet Flax.
Lupinus hybridus.	Lupine.
Lychnis (see *Agrostemma*).	
Lobelia erinus.	Lobelia.
Malcomia.	Virginian Stock.
Malope trifida.	Mallow-Wort.
Martynia fragrans.	Elephant's Trunk.
Matricaria hybridus.	Snowball Chrysanthemum.
Matthiola.	Ten Week Stocks.
Mesembryanthemum crystallium.	Ice Plant.
Mentzelia Lindleyi (see *Bartonia*).	
Mimulus cardinalis.	Monkey Flower.
Nasturtium.	Nasturtium.
Nemesia.	Nemesia.
Nemophila insignis.	Californian Bluebell.
Nicotiana.	Ornamental Tobacco.
Nigella.	Love-in-a-Mist.
Petunia violacea hybrida.	Petunia.
Papaver Annual.	Poppy.
Perilla.	Perilla.
Phacelia campanularia.	Phacelia.
Phlox Drummondii.	Annual Phlox.
Portulaca.	Portulaca.
Reseda.	Mignonette.
Rhodanthe.	Swan River Everlasting.

Ricinus.	Castor-Oil Plant.
Salpiglossis.	Painted Tube Tongue.
Scabiosa.	Pin Cushion Flower.
Schizanthus.	Butterfly Flower.
Salvia splendens.	Scarlet Sage.
Sedum caeruleum.	Stonecrop.
Tagetes.	Marigolds (African and French).
Thunbergia alata.	Thunbergia.
Tropaeolum.	Nasturtium.
Tropaeolum canariense.	Canary-bird Vine.
Viscaria.	Viscaria.
Verbena hybrida.	Verbena.
Whitlavia grandiflora.	Whitlavia.
Viola.	Pansy.
Xeranthemum.	Immortelle.
Zinnia.	Youth and Age.

PLANT NAMES OF ANNUALS FREQUENTLY MISPRONOUNCED.

Wm. Hunt, Guelph.

Malope	mal′-ō-pē	not	māy′-lope.
Mina	mi′-na	not	min′-a.
Nasturtium	nas-tür′-shi-um	not	na-stur′-tion.
Nemesia	nĕ-mē′si-a	not	nem̄-e-si′-a.
Nemophila	nē-mof′-il-a	not	nē-mo-fil′-a.
Nicotiana	nĭ-kō-shi-ā′-na	not	nic-o ti-an′-a.
Nierembergia	nē-rem-ber′-gi-a	not	ner-em̄-burgh′-ia.
Nigella	nī-gel′-la	not	nig′-ella.
Papaver	pa-pā′-ver	not	pap′-a-ver.
Perilla	per-il′-la	not	pe-rill′-a.
Phacelia	fa-se′-li-a	not	pa ce′-lia.
Phaseolus	fa-sē′-o-lus	not	pa-se o′-lus.
Phlox	flox	not	p′-lox.
Platystemon	plăt-i-stē′-mon	not	plat-is′-tĕ-mon.
Rhodanthe	rho′-dan-thē	not	rod′-an-thē.
Ricinus	ris′-in-us	not	ri-si′-nus.
Rudbeckia	rŭd-bek′-i-a	not	rude-be′-ki-a.
Sanvitalia	san vi-tā′-li-a	not	san-vi-tay′-li-a.
Saponaria	să-pō-När′-i-a	not	sap-ō-nay′-ri-a.
Sphenogyne	sfe-nŏg′-in e	not	spen′-o-gine.
Statice	stăt′ i-se	not	stat′-ice.
Scabiosa	skā--b-iō′-sa	not	scab′ i osa.
Schizanthus	skĭz-an′-thus	not	sky′-zan-thus.
Senecio	sen-ē′-si-o.	not	se-nek′-io.
Silene	si-lē′-ne.	not	si’-lene.

BEST TWENTY-FIVE PÆONIES.

W. T. Macoun, Ottawa.

Next to the rose the pæony is, perhaps, the most popular garden flower in Canada to-day, and pæony enthusiasts would be tempted to place it before the queen of flowers.

It seems desirable, therefore, to submit to the Ontario Horticultural Association a List of Best Pæonies, a list which should be revised from year to year. The names presented are based on the experience with varieties in the collection at the Central Experimental Farm, Ottawa, and with the varieties grown by private individuals who are making a specialty of the pæony, and on the best additional information that could be obtained. It has been very difficult to select a list of the best twenty-five pæonies, as there are so many varieties of almost equal merit, and the tastes of pæony lovers differ, but the following list is submitted to the Association and criticism will be welcomed. In this list will be found some of the most expensive and some of the moderate-priced varieties. The list is sufficiently long, so that those who do not wish to buy the dearer varieties can find a sufficient number of the cheaper ones to make a good collection:—

Best Twenty-Five Paeonies.

Pure White:

Duchesse de Nemours (Calot).
Le Cygne.
Marie Lemoine.

White, edged or flecked with crimson or carmine; and flesh white:

Avalanche or Albatre.
Baroness Schroeder.
Couronne d'Or.
Festiva maxima.
Marie Jacquin.
Mons. Dupont.

Pale Pink and pale pink fading to white or edged with white:

Asa Gray.
Eugene Verdier.
Grandiflora (Richardson's).
Mademoiselle Leonie Calot.
Marguerite Gerard.
Triomphe de l'Exposition de Lille.

Pink:

Claire Dubois.
Livingstone.
Madame Auguste Dessert.
Madame Geissler.
Modeste Guerin.
Monsieur Jules Elie.
Therese.

Red:

Felix Crousse.

Dark Red:

Adolphe Rousseau.
Monsieur Martin Cahusac

THE BEST IRISES.

J. CAVERS, OAKVILLE.

TALL BEARDED IRISES.

1. *Black Prince* (neglecta), s. purplish blue; f. blackish purple; late.
2. *Caprice* (pallida), s. and f. reddish purple; one of the best "reds."
3. *Caterina* (Foster hybrid), s. light blue; f. soft lilac-blue; fragrant.
4. *Darius* (variegata), s. rich canary yellow; f. lilac-blue; margined white.
5. *Farr Anna* (Farr seedling) (plicata), s. and f. white with pale blue markings.
6. *Her Majesty* (pallida), s. rose-pink; f. bright crimson, shaded darker.
7. *Innocenza* (variegata), s. and f. ivory white.
8. *Iris Koenig* (variegata), s. old gold; f. rich maroon, bordered yellow.
9. *Juniata* (Farr seedling) (pallida), s. and f. clear blue; very tall.
10. *Loveley* (variegata), s. light yellow; f. ultra-marine blue, bordered cream.
11. *Lohengrin* (pallida), s. creamy white; f. pink, bordered lighter.
12. *Maori King* (variegata), s. golden yellow; f. deep purple-maroon.
13. *Monsignor* (neglecta), s. pale violet; f. velvety purple crimson, lighter markings.
14. *Pfauenauge* (squalens), s. olive-gold; f. bluish plum color with gold borders.
15. *Purple King*, s. and f. full purple.
16. *Pallida Dalmatica* (Princess Beatrice), s. lavender; f. deep.
17. *Piou, Mme. Blanche* (squalens), s. orange-yellow; f. lavender-blue.
18. *Princess Victoria Louise* (variegated), s. sulphur yellow; f. plum, bordered cream.
19. *Prosper Langier* (squalens), s. bronze-red; f. velvety ruby purple.
20. *Oriflamme*, s. light blue; f. rich violet purple.
21. *Rhein rixe* (amoena), s. white; f. violet-blue with white edge.
22. *Reuthe, Mrs. G.* (plicata), s. white shaded blue-gray; f. white, frilled blue.
23. *Trautlieb* (pallida), a self-colour, uniform soft rose.
24. *Wyomissing* (amoena), s. creamy white; f. deep rose-tinted flesh colour.
25. *Wyndham* (pallida) (Farr), s. lavender pink; f. veined darker shade.

INTERREGNA.

26. *Dorothea*, s. and f. milky white, tinged lilac.
27. *Fritjof*, s. soft lavender; f. soft purple, shaded lavender.
28. *Halfdar*, s. and f. creamy white.
29. *Helge*, s. and f. lemon yellow.
30. *Ingeborg*, s. and f. white; large flowers.
31. *Walhalla*, s. lavender; f. wine-red.

PUMILA HYBRIDS.

32. *Canari*, canary yellow.
33. *Cyanea*, purple.
34. *La Pactole*, deep yellow.

Foster's Hybrids.

35. *Mrs. Alan Gray,* pinkish lilac.
36. *Parvar,* deep blackish violet.
37. *Miss Willmott,* white, sometimes shaded lavender.

Spuria Section.

38. *Monnieri,* yellow.
39. *Monspur,* violet blue.
40. *Orientalis gigantea,* white with orange-yellow blotch.

Sibirica.

41. *Blue King,* blue.
42. *Orientalis,* violet.
43. *Snow Queen,* white with yellow blotch.

Sambucina.

44. *Beethoven,* s. rose-lilac; f. purple.
45. *La Vesuve,* s. lavender flushed bronze; f. violet.
46. *Mephistopheles,* s. lavender; f. rich purple.

Japanese.

47. *Osho-Kun,* tyrian blue with yellow blotches.
48. *Sano-Watashi,* white with primrose blotches.
49. *Shiratki,* silvery white with golden band.

Lurida.

50. *Redouteana,* mahogany-red, very distinct.

THE BEST HARDY PHLOXES (*Phlox paniculata*).

Miss M. E. Blacklock, Toronto.

Frau Antoine Buchner. Very large, early, white.

Von Lassburg. Equally good white, a few days later.

La Cygne. A very beautiful late creamy white, changing to pure white as it ages.

Europe. White with a small rose eye, very fine flower and panicle.

Harry Pfleiderer. White with a deep rose eye, which seems to suffuse the flower as it ages; a beautiful variety.

Bridesmaid. White with a very large rose centre, flowers medium size, panicles large.

Elizabeth Campbell. This is still the best salmon pink, with large white halo, large flower, large panicle.

Gefiou. A lovely variety, pure soft pink with a small bright rose eye; large flower and panicle.

W. C. Eagan. Panicles and flowers both immense, colour pink, but with a lilac shade to it that makes it less pleasing than Gefiou, when placed near it; but indispensable on account of its size; it has a well developed crimson eye.

Rheinlander. A darker salmon pink than Elizabeth Campbell, with medium-sized crimson eye; large flowers and panicles; a beautiful phlox.

Selma. In spite of several beautiful new pinks with crimson centres, Selma is still an outstanding phlox, on account of its height, large flowers and panicles, and the richness of its large crimson eye, but being a rosy pink it must be kept away from the salmon shades; Selma and Elizabeth Campbell fight, like the proverbial cat and dog.

Aster, Michaelmas Daisy, Novae Anglae Roseus.

Madame Paul Dutric.—Though it has medium-sized flowers and rather small panicles, no other pink quite takes the place of this variety in its softness of tint, it seems to be white with a delicate wash of lilac pink.

Mauzelbrunnen. A beautiful shade of Tyrian rose with a large, radiating centre of white, large flowers and panicles.

Jules Cambon. Supposed to be eclipsed by Mauzelbrunnen, but being a rich magenta rose, with large, clear white eye, it is so different in colour as to be indispensable as ever for those whose "colour schemes" run in that direction; it has large flowers and panicles.

Thor. The description, "orange scarlet, overlaid salmon pink with deep claret red eye," is perhaps a trifle misleading, as one expects more scarlet than this beautiful variety shows; it is really a lively carmine rose with dark eye, large flowers and panicles.

Goliath. A giant in truth, being very tall with huge heads of large crimson-carmine flowers, with darker eye; indispensable.

Dr. Konigschoffer, Baron von Dedem, G. A. Strohlein. A trio of very handsome scarlet-carmine varieties; all are larger in flower and panicle than the old favourite Coquelicot, which still holds its own for brilliance, though there is not very much choice on that score. With me, G. A. Strohlein has the largest individual flowers, but it fades in the sun (and rain) worse than any of them, though supposed to be sun-proof—in partial shade it is very fine. Each one of the trees has its own virtues, and as scarlet is a popular colour all three would not come amiss.

Tragedie. If one can judge properly in one season I should feel inclined to put this phlox at the head of the list of scarlet-carmines. It is more brilliant in colour (a pure Geranium Lake) and more velvety in texture than any of the others, and it appears to stand sun and rain better; it is certainly a wonderful colour.

General von Hentz. A scarlet-rose of great brilliance with a small lilac eye which seems, strangely enough, to intensify the colour.

Rynstrom. Supposed to be an improvement on the old variety Pantheon, but the latter can still hold its own; both are excellent deep rose pinks.

R. P. Struthers. Still to the fore in its colour—brilliant salmon rose.

Rosenberg. Huge flowers (and truss) of rich magenta crimson with a vivid blood-red eye. This is supposed to be an improvement on the old variety Bertha, but Bertha declines to be shelved, being, though small in flower, such a wonderfully rich colour, so tall, and such a profuse bloomer, that she is still to be reckoned with as a landscape variety.

Von Hochberg, Blanche Compte. Both are magnificent deep wine-crimsons, with odds in favour of Von Hochberg, perhaps; it being the taller of the two.

Le Mahdi. As nearly a pure violet-purple as you can expect in a phlox; A1 of its colour, and that a very beautiful one.

Crepuscle. An indescribable shade of mauve, with a large crimson eye, radiating into a light halo; large in flower and panicle, a very fine phlox, if the shade is weird.

Widar. A beautiful shade of mauve, with large starry white centre; flower and panicle large.

Antonin Mercie. A soft blue mauve with very large white eye, large flower and panicle; a wonderful bloomer.

Wanadis. A mottled mauve and white, large flower and panicle, good for those who do not object to mottled flowers.

LIST OF NEW OR NOVEL BEDDING PLANTS, ALL OF WHICH HAVE QUALITIES TO COMMEND THEM FOR USE IN BEDS AND BORDERS.

H. J. Moore, Queen Victoria Niagara Falls Park.

Canna, Mrs. Alfred F. Conard. A beautiful salmon pink flower borne in very large trusses. During the seasons 1914, 1915, this exceptional flower attracted more attention than any other of the thousands which are grown in the Queen Victoria Park. Its habit is erect and vigorous, growing to a height of five feet. It flowers perpetually throughout the season if planted in a light humic soil capable of retaining moisture, and not less than two feet apart. Where crowded with other plants its great beauty is somewhat marred.

Canna, Gustave Gumpper. The flowers of this plant are golden yellow and are borne in trusses of large size. The plant is of uniform growth, and very vigorous. It attains a height of four feet and is ideal for bedding. It may well be recommended for all positions where a light soil and full sunshine are available.

Canna, Hungaria. The medium-sized trusses, the individual flowers of which are large, are a deep pink in color. They are delicately marked and blotched with yellow at the base of the petals. These markings, however, are so subdued as to be unnoticeable at a distance of twenty or thirty feet. The plant makes an ideal companion for, and may be associated with, Mrs. Alfred F. Conard in any color scheme on account of the similarity of color. The plant attains a height of only three and a half feet, so that when planted with other Cannas it should be alternated, otherwise the more vigorous plants may outgrow it and so detract from its qualities.

Canna, Maros. This beautiful creamy white flower deserves a place in every flower garden. It is very free flowering and has trusses of large size and of good appearance, although slightly suffused with cream it associates splendidly with the pink varieties. In combination with Hungaria and Mrs. Alfred F. Conard it is superb. It grows very tall, five feet or more, and being very vigorous should not be crowded in planting.

Canna, Meteor. A strong and robust plant with bright blood-red flowers, the truss is large and is borne on erect stems. The foliage is light green and contrasts with the flowers, which are borne well above it. It is a valuable bedding plant and may be used freely in any bedding scheme where a good red is desired.

Canna, William Bates. This Canna possesses large trusses of pure yellow flowers. It is very free-flowering and grows to a height of at least five feet. As a distinctly yellow canna it is hard to surpass, and will rapidly supersede the old varieties of this colour.

Canna, Beacon. Those who desire a good bedding canna should try Beacon. Its flowers are a rich cardinal red, and as it rarely exceeds three and a half feet in height it is excellent for planting in beds or borders with exposed positions, as it is not liable to damage through wind storms.

Larkspur, Blue Butterfly. A floriferous plant, not distinctly an annual, but usually catalogued as one. It is very bushy and branching, and attains a height of twelve to eighteen inches. Its flowers are deep blue and the inflorescences compact. There is probably no better larkspur for bedding, as in type it is quite distinct from the rest of the class. The seed should be sown in March indoors, plants from which will flower about the first or second week in July, and continue until mid-September. A light soil is apparently most suited to the needs of the plant; it is well, therefore, to manure the ground and dig it during fall to receive the seedlings in spring. Fifteen to eighteen inches is a good distance apart, as the plants will rapidly fill the intervening spaces.

Calceolaria, mexicana. This dainty annual attracts attention wherever planted. It supplies a color very rare in bedding plants, namely, pale yellow. Being free-growing, floriferous, and of dwarf spreading habit, it quickly covers large areas. It is a very prolific seeder, and self-sown plants occur regularly where the parents were previously planted. In all probability this beautiful plant will become acclimatized in many parts of the Dominion. Being so well adapted to either sunny or shady positions it is not fastidious as to locality. It grows equally as well on the rockery as in the best prepared bed or border, and as its flowering period extends from July until mid-October very few bedding plants, annual or otherwise, excel it in this respect. It is the most satisfactory bedding Calceolaria, and is also the most distinct, as its deeply cut and fernlike foliage differs so materially from that of the others. The plant attains at times a height of two feet.

Begonia, Lafayette. This Begonia belongs to the tuberous-rooted section. It is of a somewhat spreading habit and its leaves are pointed. The flowers are double and a brilliant crimson scarlet. The plant does not attain a height of more than one foot. A semi-shady position, or the north side of a wall are excellent for its successful culture. A sunny position, apparently, is not conducive to its welfare. A heavy soil is harmful, therefore a light one containing plenty of leaf soil and capable of holding moisture should be chosen.

Begonia, Bertini. A tuberous Begonia of free-flowering habit. The flowers are single and are in color vermilion. The petals are long and pointed. In height and other characters it partly resembles Lafayette, and requires the same cultural treatment.

Begonia, Worthiana. The flowers of this plant are single, and like those of B. Bertini are vermilion. It is, however, of much dwarfer habit than either of the forementioned ones, rarely exceeding nine inches in height. In appearance the flowers are somewhat like those of the fuchsia, and in this respect it is quite distinct from other types. The culture as advised for the previously mentioned kinds is recommended.

Begonia, Fairy Queen, Pink. A fibrous-rooted variety with flowers of a deep pink color. It is readily raised from seeds or cuttings, the former should be sown during January and February to ensure plants of a satisfactory bedding size by the first of June. Cuttings may be taken from the plants in the beds in September, or from potted plants in spring. Plants removed from beds and potted make excellent flowering stock during the early spring months indoors. This variety, as well as Fairy Queen, white, another excellent variety, require the same treatment as regards soil and general culture. A light humic soil is necessary, as apparently clay is deleterious; the plants refuse to grow to perfection when more than one-fifth of the soil is clay. The forementioned varieties appear to succeed even under the powerful rays of the sun, they should, however, not be watered or sprayed overhead upon a bright day. The plants attain a height of nearly one foot when planted out of doors, and are somewhat taller under glass.

Begonia, Fairy Queen, White. A replica of Fairy Queen, pink, except in color, which, as the name implies, is white. The habit is graceful and very desirable.

Begonia, Miniature, Crimson. A fibrous-rooted begonia of compact habit, which attains a height of not more than six inches. This variety is excellent as an edging to beds where formal bedding is practised. Its culture is identical with that advised for Fairy Queen.

Begonia, Miniature, White. In habit and size like Miniature Crimson, and may be used for the same purpose. There is probably no better begonia of the semperflorens type than this one. Its flowers are pure white, and are produced in abundance either out of doors or when used as a potted plant.

REPORTS OF DELEGATES TO THE AMERICAN CIVIC ASSOCIATIONS' CONVENTION.

Rev. A. H. Scott: As far as I am concerned, I will report to you in a very few sentences. The present friendly feelings and intercourse between the American Civic and the Ontario Horticultural Associations are explained on the grounds of relationship and identity of purpose. I have had persons ask me: "What is the sense of keeping up these exchanges between the people to the south of us and ourselves, when we are dealing with two things that have no connection?" That is a very great mistake, because the two organizations are dealing with the same thing. The United States of America is a larger place in square miles than the Province from which we draw our representatives to this Convention. The delegates to the Baltimore Convention came from greater distances to the capital of Maryland for the Civic Improvement Convention than our delegates required to come when they left their Horticultural Society homes—east and west, north and south—for the convention we attended a short time ago in the City of Toronto. But while these two things are so, the idea in "Horticulture" is larger than the idea in "Civic Improvement." "Civic improvement is one branch of horticulture." Horticulture in the large sense covers four distinct departments—the department of fruits, large fruits such as apples, etc., small fruits such as strawberries, etc.; the department of vegetables; the department of flowers, annuals, biennials, perennials; and the fourth department of ornamental gardening, which covers garden designing, nature architecture, civic improvement, and such like.

Pæony Bed in Hamilton, Bordered with Iris and Early Spring Flowering Bulbs.

The Americans are ahead of us in that branch of horticulture that deals with civic improvement or nature architecture. They are older. More compulsion has been cast upon them to look after the civic improvement than upon us in Canada up to the present time. The Americans know that we in Canada have things in horticulture that are superior to theirs, and many of them are not unwilling to speak of this. We, on the other hand, have much to learn from the Americans in the particular department of horticulture that goes by the name of ornamental architecture, nature designing, landscape gardening, or civic improvement. Hence, the propriety of their sending representatives to us, and our sending representatives to them on the convention occasions.

So far as the last convention is concerned that was held in the City of Washington, the proceedings there were a good deal like those that mark our conventions here. They had a programme, the Convention had the social side, it had its distinguished representatives from a distance. It had its contribution from the Province of Ontario, and your Superintendent was honored by being elected vice-president of that great national association, and they did me the honor of electing me director.

These conventions of a Civic Improvement Association are really very important. They deal with very large things; and while the convention itself, perhaps, has in its regular sessions not any greater number of persons in attendance than we have in our own Association at a Horticultural Convention, yet they deal with things that relate to the sister nation to the south of us, and they relate to ourselves here in the north land. We deal with matters there that have reference to the city, the town, the country, and the morals of the people, which is really the largest feature in the whole matter which appeals to me—the morals of the country, the well being of society, the housing of the poor, the residential places of the rich, and that keeping of equilibrium of classes which under a kindly Providence in those Western Provinces should always be sought after. These are the things at the American Civic Association which appeal most to me. It is not going to that convention for a holiday, it is not going there to have one's expenses paid, but it is going to that place as representatives of one of the most favored places of the world, this Province of Ontario, and going to a people who are friendly to the British Empire, and who have problems to solve the same as we are trying to solve up here. And we learn from them because they have made numerous and tremendous blunders, and we will not make them here because we will run along the lines of prevention rather than on those of cure.

J. Lockie Wilson: It has been my privilege to attend the meetings at Pittsburg, Cincinnati, Baltimore and Washington, and at those conventions your delegates took a reasonably active part at their meeting.

Our American friends were more than pleased to learn of the magnificent organization we had in Ontario. Our organization, I am bound to say, is on a much firmer basis than theirs is. Ours is receiving assistance from the Government of this country. None of theirs in the United States receive any assistance from the Departments of the Government. They were much surprised to learn of the manner in which our organization was being managed. Ours is a quasi-Government Association in so far as the Horticultural Societies have a member of the Department of Agriculture to edit the reports and act as your Superintendent and Secretary, with the able assistance of the Board of Directors. It is a tribute to our people that the American Civic Association in its excellent judgment selected a Canadian to be their representative here.

The work that was performed at the last American Convention was of value to our Association in so far as it gave us some insight into the best methods of working the Institution. I think, perhaps, that on the whole, the American Civic Association could learn a great deal more from us so far as organization is concerned than we from them. But they are progressing. One thing was worthy of note, and that is that the newspapers of Washington took perhaps fully more interest in the work of the American Civic Association than ours do. I notice in some of our papers eight or ten lines have been given to this Association's work, others are giving a fuller report. But this institution is of such vital importance that we should at least have a column in every newspaper in the City of Toronto.

This Association may say, what are we getting for the trips that we are paying for the delegates every year? I will tell you what you got out of that last year. We had our Vegetable Growers' Convention here the day before yours started, and had with us one of the men foremost in the work of the American Vegetable Growers' Association, and his address was of exceedingly great value to those who were fortunate enough to hear him. Our Association is indebted to the delegates who attended conventions in different parts of this continent for securing so many of the brilliant men we have each year. It is a great thing for this Institution to have the men of the whole continent to draw from. If it had not been for the good offices of our delegates we would not have had the benefit of addresses from such speakers as John Dunbar, of Rochester, J. Horace McFarland, Harrisburg, Miss Louise Klein Miller, Cleveland, and last, but not least, Thos. Adams, the town-planning expert, who comes, I understand, from Auld Reekie. Having all these prominent people with us reminds me of the story of the Scottish farmer's son who held a leading commercial position in his native land. On his return from a visit to London his father asked him what he thought of the English. He replied, "I did not see any of them. My business was with the heads of the departments."

W. B. Burgoyne: You already have had such a good report of the American Civic Association meeting that it is not necessary that I take up much of your time. I have enjoyed four sessions of the American Civic Association—one in Cincinnati, one in Baltimore, two in Washington. At the last one in Washington I was in physically bad condition. That prevented me, perhaps, from enjoying it as much as I would otherwise have done. These Conventions are addressed by very able speakers, and are very much along the same lines as our own conventions. On the whole they do very good work. I have often thought if they would visit Canada not merely with a representative, but in a body, they could learn some lessons here that we could impart to them and they could broaden out their organizations. All these are doing good work. It is hard for them to keep up to the standard sometimes on which they are first organized, and the American Civic Association would benefit by going around more. Even coming to Toronto, seeing what we do and how we do it would help them all in their work.

The President then read an invitation from Mr. Thomas Adams, as follows:—

"On behalf or the Commission of Conservation, we would welcome a delegate from the Ontario Horticultural Association at a Conference to be held in Ottawa on Friday, the 19th inst., at ten a.m. Sir John Willis will take the chair, and the object is to form a Civic Improvement League for the whole of Canada."

W. B. Burgoyne: If there is a little time to spare, I think further reference to the matter introduced by Mr. Adams in his invitation would be worth while. For some years we have regretted the lack of money forthcoming from the American Government for the American Civic Association. I think we would be very poor in Ontario if we did not have the Government at our back in the grant of $12,000. The American Civic Association, although meeting at Washington, and sometimes addressed by members of the Government, even the President of the United States, gets no support or pecuniary aid under their system of Government. We have always desired that we might have something like the American Civic Association in Canada, and it is coming about in this way through the Conservation Commission, and through Mr. Adams' advent to Canada, and if the time is given to this, owing to the support it will receive from the Dominion Government, which is paying all the expenses of this Conservation Commission, this new organization will succeed as the American Civic Association never did on the other side, because of the fact that it has behind it the Dominion Government. I think the finest work ever done in any democratic country is going to be done in the Dominion of Canada in this connection.

Moved by A. H. SCOTT, seconded by C. A. HESSON: "That as the Ontario Horticultural Association depends in great measure for the dissemination of its principles and the carrying out of its purposes upon the literature which has been the outcome of its Annual Convention, it is hereby recorded as the particular wish of the Tenth Annual Convention, that the next issue of the Report from the Horticultural Societies of the Province of Ontario should number at least 14,000 copies, and that the following be a committee to wait on the Hon. Mr. Duff in this regard:—

Mr. T. D. DOCKRAY, Toronto.
Mr. W. B. BURGOYNE, St. Catharines.
Rev. A. H. SCOTT, Perth.
Rev. G. W. TEBBS, Hamilton. Carried.

Moved by J. H. BENNETT, seconded by J. LOCKIE WILSON: "That this Association nominate or elect a representative to attend the Convention of the Commission of Conservation, to be held in Ottawa on Friday, the 19th inst., at 10 a.m.; and that Mr. R. B. Whyte, Ottawa, and Rev. A. H. Scott, of Perth, be delegates to attend."

Moved by Dr. F. E. BENNETT, seconded by W. B. BURGOYNE: "That the incoming President name a committee to arrange for an excursion, either to Rochester or Ottawa, or both, during the month of May or June, whenever is the best season to see the different shrubs of flowers in bloom at that period." Carried.

A Committee for the above purpose was appointed, namely: J. Lockie Wilson, F. E. Bennett, of St. Thomas, W. B. Burgoyne, St. Catharines.

Mover by W. B. BURGOYNE, seconded by Rev. A. H. SCOTT: "Having regard to the desirability of having legislation in Ontario to enable cities, towns, and municipalities to prepare town-planning schemes in order to secure the improved layout of towns, more spacious surroundings to buildings and healthier conditions of home life, we, the Ontario Horticultural Association in Annual Convention assembled, resolve to petition the Legislature of the Province to consider the desirability of passing a Town-Planning Act, and that a copy of this resolution be sent to the Premier and the Provincial Secretary of Ontario."

C. A. HESSON: I find that we have representatives from thirty-nine societies at this Convention, out of a total eighty-six societies in the Province. Also I have a total of 139 delegates. You will permit me to emphasize the matter of the card system which we are trying to work up, because by the use of those cards we are going to know just exactly who visits the Convention and what Societies are affiliated and paying attention to our Convention.

After considerable discussion as to whether the Ontario Horticultural Association should be represented by one of their members at the National Council of Women, a motion favoring this was defeated.

CALIFORNIA IN SUMMER FROM A HORTICULTURAL STANDPOINT.

BY W. T. MACOUN, DOMINION HORTICULTURIST.

Comparatively few Canadians visit California during the summer months. It is when the frost and snow of winter make life, for some, less enjoyable in Canada than at other seasons of the year that their thoughts are turned to the sunny south and those who can afford to do so, or who can arrange to do so, go to California, there to find a genial contrast to the cold which they have left behind and a greenness and wealth of bloom which they would have to wait for months to see if they remained at home.

It was the writer's privilege and pleasure to visit California this year in summer and to motor for hundreds of miles over those perfect roads for which California is noted, and to see many of the interesting places there, including the Panama Pacific Exposition at San Francisco and the Panama California Exposition at San Diego.

Coming down from Oregon by the Union Pacific Railroad one awakens in the morning to find oneself in the great Sacramento Valley of California, some 300 miles in length and 50 to 60 in breadth. The land is apparently quite level and if it were not for the large oak trees scattered over the valley which give a very park-like effect one would be much reminded of the level prairies of the drier parts of southern Alberta. Grain growing and stock raising appear to be the principal occupations of the settlers and in the month of August, with the exception of the large native oak trees already mentioned, there was little of interest for the horticulturist. There is little irrigation in this part of the Sacramento Valley, the grain being grown without it, and in the latter part of August after the grain had been cut and threshed and after several months of dry weather the country looked very brown. As one approaches Sacramento, about ninety miles north-east of San Francisco, orchards of various kinds of fruit become more numerous, but the land continued level and the scenery not particularly attractive. Berkeley, which is across the bay eastward from San Francisco is a university city and the home of many people whose business is in San Francisco. It was here that the meeting of the American Pomological Society was held and the writer made this his headquarters for nearly a week. I had often heard of the beauty of Berkeley, but in the first week of September when I was there there was little bloom in the gardens and some of our own Ontario towns with their maple or elm avenues, green lawns, and well-kept flower gardens are, in my judgment, much more attractive than was Berkeley at that season of the year. It is so dry there and water is so scarce that few persons attempt to have lawns. It is necessary to water continuously, I was told, to keep the grass green and the absence of grass is the thing that is most noticeable to an easterner. The result is that what flowers there are have not the green setting which is so essential if one is to get the most pleasing effects. The scarcity of grass and lawns in California is well brought out in a few words in a story in a recent number of one of the American magazines.

"Two young people were sitting conversing on a bench near Pasadena in southern California.

"He—'It's one of my favorite loafing places and its unique. I am always happy up here.'

"She—'Why there's grass!'

"He—'I said it's unique. You can rate a Californian as closely by the size of his lawn as you can from a commercial agency. Grass costs a lot of money.'

"'I never thought' she mused, 'that I'd be so pleased at a tiny tuft of grass under a hedge; how different our points of view are.'"

Owing to the absence of rain and the absence of street watering, and few of the streets seemed to be oiled at Berkeley, the shrubs, trees and herbaceous plants were very dusty. I never realized what a drought resistant plant the geranium is until I saw it in California. It is the commonest flower in the gardens there, the plants being large and shrub-like, hedges in many places being made of them, but even geraniums, showy as they are, do not look very well growing in dust and unrelieved by grass, and the individual flowers at this time of year were not of very good quality.

One would expect to find grass on the university grounds, if anywhere, but green lawns in summer are not attempted even there. They have some good plants for covering the ground which are used instead of grass. One plant which is very effective is the English Ivy, which forms a close mat of green and is very refreshing when in contrast with dry grass or simply earth. Then the wild strawberry of the west coast (Fragaria chiloensis) stands the drought well and makes a good ground cover. This is used about one of the university buildings. Other thick leaved plants such as Sedum and Mesembryanthemum are also employed in places on the boulevards in front of residences to take the place of grass. The principal flowers in the gardens were geraniums, dahlias and gladioli. In places where people could afford to use sufficient water, most of the annuals grown in eastern Canada were found and it was a surprise to me to find so few plants in bloom in September that are not found in our own gardens. It is in winter, in spring, and in early summer when one sees the largest number of flowers in California that one does not have at home. Among climbing plants in bloom at this season the bongainvillea and morning glory are the two most generally seen. The morning glory grows to a great height and is very effective as is the bougainvillea, which one sees in two shades of color. A climbing species of solanum with bluish potato-like flowers was very attractive in southern California.

Most of the interesting trees and shrubs used for ornamental purposes in California are introduced species. The eucalyptus in several species is the most outstanding tree, the Blue Gum (Eucalyptus globulus) being, perhaps, the commonest. One sees it everywhere as it seems to thrive even in the driest places, without irrigation. It grows rapidly, making, when young, from twelve to fifteen feet or more of growth in a year. The trees are more ornamental when young than when they get to be tall trees as the latter, though striking, are rather ragged in appearance. The bark drops off the trunks of the trees making the ground about them untidy, unless the bark is kept removed. Next to the eucalyptus, the Pepper Tree (Schinus molle) is perhaps the commonest tree. It is used very freely as a shade tree and is quite attractive in appearance, but is not so popular as it once was as scale insects affect it badly. It is of a pendulous habit with acacia-like foliage. The acacia, of which there are many species, is used very much as a street tree, the Black Acacia, which is of a rather upright habit of growth, being most met with. Palms are, of course, in evidence nearly everywhere, but are in greatest abundance in southern California. Two types of palms which are more common than others are the Date Palms of which Phoenix canariensis is the most planted for ornament, and the Fan-leaved Palms or Washingtonias. It is unfortunate that in many places in California these palms are used on grounds where the architecture of the buildings is distinctly northern or east American, with the result that they, or the house, look out of place. Associated with southern architecture or when planted in avenues or when grown as single specimens not associated with buildings of an architecture which seems foreign to them these palms are very stately and impressive.

Grevillea robusta, which in the east we grow as a pot plant in the conservatory, is a good sized tree when grown in the open in California. The Monterey Cypress (Cypressus macrocarpa) is a picturesque native evergreen which is frequently met with. In the dry valleys, except along the rivers where poplars, willows and box elder resemble somewhat the trees found in Western Canada, one sees an almost entirely different vegetation from at home. The big Tree (Sequoia gigantea) of the Sierra Nevada Mountains and the Redwood (Sequoia sempervirens) of the coast regions are among the most noted native trees on account of their great size. Great areas in California now covered with orchards were little more than deserts with few if any trees before the irrigation water came to entirely change the face of the earth. Go to the top of a hill as we did in a number of places and see the miles upon miles of orchards with dry and barren places in contrast and you will realize what wonders water has wrought. The irrigation water is carried in pipes below ground with upright pipes at intervals from which the water is led through the orchards in open ditches.

The variety of crops which can be grown in California is wonderful, in the cooler districts and higher elevations the apple is grown in large quantities and in addition to the other fruits which we are familiar with in Canada there are oranges, lemons, grape fruit, avocados, pomegranates, figs, dates, walnuts, almonds, olives, grapes for raisins and grapes for eating fresh, and what not. One may even eat the fruit of Burbank's Spineless Cactus. Most of the fruits above mentioned were ripe when we were there.

While California was visited at a season of the year when there was perhaps less to attract the lover of horticulture, especially the lover of flowers, than at any other time, the greatness of the resources and the variety of the climate in different parts of the State was impressed upon us. California is about 800 miles in length and from 150 to 350 miles in breadth, being the second largest State. In the north the average rainfall at the coast is about forty inches while in the south it is, perhaps, one fourth of this. There is a range of mountains near the coast and east of this are the great dry interior valleys in which most of the fruit is grown. The Sacramento and San Joaquin Valleys, two of the largest, are together about 500 miles long and reach a width of sixty miles. It is very hot and dry in these valleys in summer while at San Francisco and other places at the coast the temperature is moderate and the nights cool. Owing to the great amount of moisture the country is more wooded along the coast in the northern part of the State than in the south.

One cannot give in a short paper a very good idea of the horticulture at the San Diego and Panama Pacific Expositions. In planning and producing the landscape effects which were so marked a feature of both of these expositions, there was a great variety of material to work with and it was used in a most skilful manner. This was more apparent at San Diego where the smaller size of the buildings did not seem so much out of proportion to the size of the trees and shrubs as in San Francisco, but at both the effects were very fine. The flower gardens were rather disappointing at the exhibition in San Francisco, but it was early September when they were seen and doubtless they were better earlier in the season. Dahlias, gladioli, roses, sweet peas, and begonias were the principal flowers in bloom, and the individual flowers were, on the whole, not of exceptional merit. In the Palace of Horticulture, under the great dome, there was a lack of plants. The exhibits of fruit were not large at that time, except from California and Canada and the Canadian exhibit, on the whole, and the Canadian apples in particular, were unsurpassed.

It was our pleasure to spend between two and three hours with Luther Burbank at his house and trial grounds at Santa Rosa, where he very courteously showed us some of his new things. Throughout the visit to California the greatest courtesy was shown by all horticulturists and everything possible done to entertain us.

Coming home to Ontario in the latter part of September and finding abundance of green lawns and beautiful flowers, finer, we thought, than those of the same kind seen in California, Canada looked good to us, but we shall have to visit California in winter or spring before making final comparisons.

VACANT LOT GARDENING.

Geo. Baldwin, Toronto.

In writing a paper on Vacant Lot Gardening one must go back a few years and see where and how it originated.

At the time of the Egyptian War in 1883-4-5, the British Isles were suffering from a great trade depression, factories all over the country were closing down and throwing men out of employment. It was at this time that the late Rt. Hon. Joseph Chamberlain, the inventor of the improved screw-nail, and an authority on the growing of orchids, advocated the back to the land movement, and startled rural England with the problem of giving every man, "Three Acres and a Cow." No question was probably held up to more ridicule than this. The idea of providing every rustic with three acres and a cow, unfortunately for its author, fell to the ground, but it produced one good result, viz.; the passing of the Allotments Act in 1887 (the late Queen Victoria's Jubilee year) by means of which country, town, and city dwellers are enabled to obtain plots of land for gardening purposes. It is needless for me to explain the workings of the allotment system in England, suffice it to say that there are many allotment gardens under cultivation in cities, towns and hamlets, which are most successful. The gardeners have to pay a shilling per statute rod per annum; several of the large land owners subdivide parts of their estates for this purpose. Seventeen years ago the idea was first introduced to the City of Philadelphia, and has met with unqualified success, starting off with sixty-seven gardens the first year, and considerably over 600 gardens last year, with a total aggregate value of the crops raised of over $30,000. Minneapolis, Detroit and other cities in the United States also have their vacant lot gardens, and a few years ago the movement established itself in Canada, Calgary, Fort William, Hamilton, and finally Ottawa, and Toronto falling into line, and being the Superintendent of The Toronto Vacant Lots Cultivation Association, I will give you an idea of how the work is carried on here.

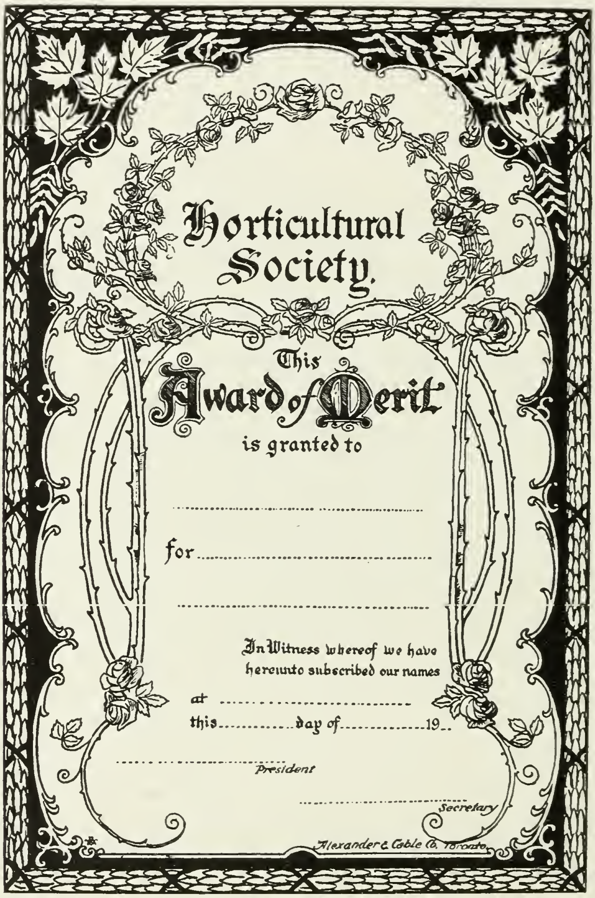
Mr. H. J. Dingman is the father of the movement in Toronto, and through his untiring energies and after a six months' campaign, he was successful in getting it started, and it is at present working under two heads, first the Rotary Club, and then the Toronto Vacant Lots Association, the latter getting started on May 27th, 1915, with the following officers and directors:

Sir Wm. R. Meredith, President.
Noel Marshall, Vice-President.
D. A. Dunlap, Treasurer.
Geo. Baldwin, Secretary and Superintendent.
Directors: Dr. C. C. James, Sir John Willison, Frank Roden, Dr. C. J. O. Hastings, H. J. Dingman, J. Lockie Wilson.

The first purpose for which our work was organized was the opening of an opportunity for those in need to acquire material supplies by their own efforts in cultivating tracts of City land which were otherwise lying in waste, and to improve the lives of those to whom we assign gardens. This will continue to be our main purpose, it will improve the health, and the material welfare of its beneficiaries, in a more practical and far-reaching way, without pauperizing them, than any other organized philanthropic work which is being carried on in our fair City. The initial proceedings consist in obtaining the use of vacant land, plowing and harrowing the soil, and providing seeds, for which a nominal charge is made of $1 from the tenants who do their own planting, cultivating, and gather the matured products. After supplying their family needs they sell any surplus that remains. While acquiring health and happiness, and receiving valuable training and experience, the men, women, and children join in increasing their material supplies. As their own work produces the results they are not pauperized but encouraged to be more industrious and self dependent and acquire greater ability and self respect. In the centre of the districts, as near as possible, a demonstrating plot is situated, where on Saturday afternoon and evenings the Superintendent instructs the gardeners in the proper methods of sowing seeds, showing the proper depth to sow in drills, the proper distance between rows, and special instructions in the growing, cultivating and spraying of potatoes, the staple vegetable.

Cannas and Geraniums at Street Intersection, St. Thomas.

It was very edifying to find the interest that was manifested, especially by those who had had very little practical experience before. The Association was also good enough to provide for the free spraying of potatoes, which was very much appreciated, and was instrumental in keeping the potato bug from doing any material damage. Each gardener is given a blank form, to be filled in by him at the close of the season, showing when seeds were planted, amount of ground used for each kind, and results, giving an approximate value of the total crop. These blank forms have been in the majority of cases returned filled in, and considering the lateness in starting and the very inclement weather, the results were as good as anticipated. The gardeners have to remove all stakes and burn rubbish by October 20th, on which date the Association make preparations for the next season by hauling and spreading manure (which was this year given free by The Union Stock Yards), then plowing and staking the ground into lots, so that all that it will be necessary to do in the spring will be to harrow the land and allot the gardens to applicants; consequently, we look forward to a more successful year. Let me offer a few words in praise of the work accomplished by the Rotary Club, which is a body of business and professional men, banded together for the purpose of benefiting mankind in general. Out of their own pockets they carried on the work this year, of taking care of over 19 acres comprising 130 gardens, and they estimate the total value of the year's crop at $5,700, and when you consider this amount goes into the pockets of the deserving poor, I think you will agree with me that they have done remarkably well and deserve great credit.



Horticultural Society.

This Award of Merit is granted to

....

for ....

....

In Witness whereof we have hereunto subscribed our names

at ....

this .... day of .... 19..

.... President

.... Secretary

Alexander & Cable Co. Toronto.

Neat Form of Diploma for Horticultural Societies

They have certainly convinced our City Fathers that the undertaking can be carried to a successful issue, and that it is worthy of the City's support, and should not be left to a few to bear the expense. The Rotary Club, like our own Association, have decided to carry on the work again next year, our two committee's have met together and discussed ways and means whereby the City will be divided up between us, and both work in harmony for the general good of the community and avoid overlapping. Our Association is indebted to the Rotary Club for the splendid spirit which they have shown towards our branch. We also have to thank the Agricultural Department for the distribution to our gardeners of a small book on gardening, edited by Mr. S. C. Johnston. We are also indebted to the City and other generous persons for the loan of vacant land. And as The Toronto Vacant Lots Cultivation Association is kept up by voluntary contributions we have to thank, on behalf of the beneficiaries, those who kindly contributed and made it possible to carry on the work. It is the intention of the Association to try to double their efforts for 1916, and to offer prizes for the best kept and most productive gardens. A series of lectures to be given by the Superintendent during the winter on gardening is being arranged. It is not my intention of giving details of gardening now, and my main object in complying with Mr. Lockie Wilson's request to read a paper on Vacant Lot Gardens was to try to induce the delegates of this convention to take the matter up in their own towns and districts. I may add that I shall be only too pleased to give any further information now or by letter to any one desiring same. I omitted to state that the size of the lots we assign to the gardeners is about 5,000 square feet, and that the front three feet of every garden must be planted with dwarf nasturtiums, and as one of our blocks of land was three-quarters of a mile long you can imagine what a blaze of bloom we had.

After singing the National Anthem the Convention for 1915 was brought to a close.

ACTUAL RECEIPTS AND EXPENDITURE OF HORTICULTURAL SOCIETIES IN 1915.

Societies.	Members' fees.	Legislative grant.	Municipal grants and donations.	Gate receipts at exhibitions.	Total actual receipts.	For exhibitions.	For seeds, bulbs and plants and Civic Improvement.	Lectures and periodicals.	Officers' salaries.	Total actual expenditure.
	$	$	$	$	$	$	$	$	$	$
Amherstburg	90	121	85	......	384	......	333	......	15	380
Barrie	115	234	180	35	643	178	227	7	35	637
Belleville	103	95	50	......	251	......	193	13	25	293
Berlin	208	363	200	152	1,086	454	243	23	75	1,127
Bowmanville	95	66	......	......	161	......	140	......	15	163
Brampton	223	174	......	......	414	......	283	112	......	427
Brantford	249	266	100	......	615	*206	233	57	100	669
Cardinal	52	49	......	......	109	......	101	......	......	113
Carleton Place	188	90	30	45	353	*10	222	9	......	318
Cayuga	50	54	114	......	218	......	152	27	......	231
Chatham	208	75	108	......	393	......	231	......	......	302
Chesterville	56	37	......	......	94	......	73	......	15	103
Clifford	99	190	20	230	727	293	40	......	30	616
Clinton	190	133	31	......	375	......	202	......	10	375
Cobourg	83	71	......	......	168	......	93	43	2	168
Dryden	55	54	37	19	282	63	93	*22	25	281
Dundalk	42	50	6	......	122	32	62	6	10	139
Dundas	106	75	......	76	400	37	119	54	25	286
Durham	56	74	10	19	197	59	68	1	30	189
Elmira	74	110	......	24	208	68	68	42	......	199
Essex	114	75	20	......	216	......	135	......	......	147
Fergus	70	52	10	12	148	80	20	......	15	172
Fort William	99	101	30	......	249	96	82	3	......	256
Galt	221	223	114	46	613	244	164	72	75	697
Goderich	139	97	45	......	281	......	205	73	20	315
Grimsby	72	68	......	......	141	......	41	48	......	106
Guelph	166	215	100	60	668	......	207	124	......	649
Haileybury	65	106	54	29	286	240	......	......	35	371
Hamilton	457	474	50	......	1,041	......	449	96	100	920
Hanover	141	116	36	13	335	......	201	16	20	285
Hespeler	85	64	......	......	241	......	173	45	10	241
High Park	125	90	......	......	218	83	......	......	20	196
Kingston	190	77	......	54	352	296	......	......	50	563
Kingsville	97	109	60	......	315	......	185	......	20	286
Lindsay	75	57	......	......	138	122	41	......	25	200
London	400	383	......	......	811	73	249	226	110	801
Markdale	40	66	10	......	177	51	73	......	......	165
Midland	78	82	......	4	166	30	115	2	5	178
Millbrook	69	52	......	......	121	......	64	33	......	119
Milton	107	75	......	17	200	49	68	......	......	191
Mitchell	112	85	6	......	212	......	124	54	15	217
Napanee	60	51	20	......	145	......	138	31	25	197
Newcastle	78	60	......	......	138	5	131	2	......	164
Oakville	105	83	......	......	201	......	162	6	......	185
Orangeville	127	143	......	16	447	61	333	......	......	468
Oshawa	180	106	......	......	287	......	224	......	......	255
Ottawa	614	470	257	......	1,350	156	654	......	150	1,364
Owen Sound	116	145	29	36	376	159	101	8	30	372
Paris	133	138	125	54	514	141	162	79	......	493
Perth	186	178	31	......	500	......	268	93	25	545
Peterborough	348	228	100	......	688	12	421	96	50	690
Picton	74	68	......	......	142	......	96	13	20	144
Port Credit	78	75	10	......	164	35	19	56	......	159
Port Dover	87	135	136	22	422	219	95	57	40	444
Port Hope	136	103	......	......	239	......	139	70	10	226
Richmond Hill	85	75	36	......	196	61	64	......	......	189

* For lawns and gardens, etc.

ACTUAL RECEIPTS AND EXPENDITURE OF HORTICULTURAL SOCIETIES IN 1915.—Continued.

Societies.	Members' fees.	Legislative grant.	Municipal grants and donations.	Gate receipts at exhibitions.	Total actual receipts.	For exhibitions.	For seeds, bulbs and plants and Civic Improvement.	Lectures and periodicals.	Officers' salaries.	Total actual expenditure.
	$	$	$	$	$	$	$	$	$	$
St. Catharines	772	800	417	330	2,460	445	732	26	200	2,113
St. Thomas	1,339	800	872	......	4,176	......	3,369	69	426	4,164
Sandwich	213	167	554	......	1,185	44	581	4	50	1,308
Sault Ste. Marie	69	67	......	......	149	43	*23	......	25	139
Seaforth	87	106	25	......	384	......	248	18	25	383
Smith's Falls	103	162	200	17	482	60	438	13	......	573
Sterling	67	62	2	......	142	6	101	34	......	175
Stratford	501	343	15	......	939	......	713	11	60	950
Strathroy	211	113	......	......	324	54	165	37	25	324
Streetsville	96	69	......	......	165	10	98	48	5	168
Tillsonburg	143	102	45	18	487	70	190	7	25	439
Toronto	1,503	500	467	44	2,806	451	279	28	100	2,456
Walkerton	75	67	......	42	192	25	91	39	22	242
Walkerville	362	250	250	......	882	......	660	......	50	848
Waterloo	111	140	25	33	317	53	135	24	40	306
Westboro	92	61	......	......	154	6	74	......	......	109
Weston	145	108	10	......	299	124	118	......	14	340
Whitby	109	60	......	......	234	......	154	51	......	248
Winchester	112	127	55	......	356	22	201	......	60	342
Windsor	537	549	500	......	1,735	......	1,564	39	75	2,131
Woodstock	102	74	100	43	333	67	76	6	35	277
Totals	24,420	11,833	5,787	1,490	38,139	5.093	18,899	2,173	2,519	48,021

* For lawns and gardens, etc.

STATEMENT OF MEMBERSHIP AND LEGISLATIVE GRANTS FOR 1914-15.

Societies.	Expenditure in 1914, on which grant for 1915 is based.	Membership.		Legislative grants.		
		1914	1915	1914	1915	1916
	$ c.					
Amherstburg	363 14	122	90	157	121	108
Barrie	727 81	212	175	236	234	188
Belleville	271 74	104	103	90	95	93
Berlin	1,142 87	315	266	325	363	320
Bowmanville	150 19	104	95	83	66	62
Brampton	436 84	238	223	166	174	156
Brantford	656 67	372	249	224	266	216
Cardinal	123 76	70	52	68	49	40
Carleton Place	218 42	132	188	75	90	122
Cayuga (organized in 1915)	....	....	50	....	....	64
Chatham (organized in 1915)	....	....	208	....	....	125
Chesterville	93 75	51	56	46	37	38
Clifford	676 67	104	151	240	190	176
Clinton	338 85	180	190	137	133	135
Cobourg	189 00	93	83	96	71	61
Dryden	139 41	71	55	75	54	77
Dundalk	140 73	57	63	62	50	48
Dundas (organized in 1915)	....	....	106	....	....	92
Durham	235 43	65	56	74	74	57
Elmira	343 56	100	86	126	110	67

STATEMENT OF MEMBERSHIP AND LEGISLATIVE GRANTS FOR 1914-15.—Continued.

Societies.	Expenditure in 1914, on which grant for 1915 is based	Membership.		Legislative grants.		
		1914	1915	1914	1915	1916
	$ c.			$	$	
Essex (organized in 1915)	....	....	114	....	....	64
Fergus	142 50	62	70	57	52	57
Fort William	253 69	137	123	108	101	91
Galt	640 34	241	221	225	223	214
Goderich	254 68	125	139	116	97	104
Grimsby	183 67	84	69	93	68	43
Guelph	610 09	238	166	277	215	188
Haileybury	332 54	96	91	101	106	107
Hamilton	1,226 83	618	457	495	474	329
Hanover	318 43	139	141	100	116	102
Hespeler	182 97	71	85	73	64	76
High Park	220 75	130	125	134	90	78
Kincardine	166 41	74	....	84	61	......
Kingston	177 65	120	190	254	77	176
Kingsville	350 10	91	97	104	109	89
Lindsay	138 80	83	75	59	57	65
London	1,078 83	431	400	433	383	288
Markdale	207 90	59	60	72	66	53
Midland	223 06	103	78	92	82	61
Millbrook	133 35	73	69	61	52	46
Milton (Re-organized in 1915)	....	....	105	....	....	71
Mitchell	227 35	109	112	98	85	79
Napanee	139 09	61	60	66	51	60
Newcastle	157 32	77	78	75	60	58
Oakville	203 23	120	105	79	83	70
Orangeville	439 84	132	127	158	143	138
Oshawa	266 01	146	180	102	106	106
Ottawa	1,331 26	525	614	494	470	470
Owen Sound	454 98	130	140	152	145	121
Paris	416 87	136	133	106	138	145
Perth	512 06	196	186	212	178	171
Peterborough	628 70	270	360	305	228	251
Picton	179 46	90	74	89	68	52
Port Credit (organized in 1915)	....	....	78	....	....	57
Port Dover	458 26	91	87	121	135	121
Port Hope	253 64	145	136	118	103	88
Richmond Hill (organized in 1915)	....	....	85	....	....	65
St. Catharines	2,560 37	957	772	800	800	677
St. Thomas	2,415 01	1 070	1,370	614	800	800
Sandwich	498 38	169	213	80	167	344
Sault Ste. Marie	178 45	85	90	99	67	56
Seaforth	343 59	84	87	84	106	108
Smith's Falls	542 04	114	103	202	162	153
Stirling	168 37	75	67	61	62	57
Stratford	825 03	500	501	159	343	349
Strathroy	293 96	150	211	142	113	130
Streetsville	168 13	100	96	75	69	64
Thornbury	124 34	65	....	73	48	......
Tillsonburg	288 54	115	143	114	102	136
Toronto	2,140 21	630	1,179	500	500	500
Walkerton	179 25	84	75	80	67	54
Walkerville	718 84	273	362	305	250	287
Waterloo	389 94	162	111	123	140	98
Westboro	153 76	84	92	75	61	50
Weston	268 83	151	158	128	108	119
Whitby	163 50	75	109	67	60	85
Winchester	363 50	139	112	103	127	106
Windsor	1,817 38	406	537	433	549	614
Woodstock	215 70	79	102	129	74	89
Totals	33,576 62	13,160	14,465	11,839	11,438	11,475

PRESIDENTS AND SECRETARIES OF HORTICULTURAL SOCIETIES.

Societies.	Presidents.	Secretaries.	Address.
Amherstburg	O. Teeter	Rev. F. O. Nichol	Amherstburg.
Aylmer	F. L. Wagner	A. J. Elliott	Aylmer.
Barrie	J. F. D. Norman	T. T. Young	Barrie.
Belleville	A. R. Walker	W. Jeffers Diamond	Belleville.
Berlin	J. A. Hallman	Wm. Downing	Berlin.
Bowmanville	R. Jarvis	Jas. Deyman	Bowmanville.
Brampton	T. Thauburn	F. T. Jennings	Brampton.
Brantford	E. E. C. Kilmer	H. S. Tapscott	Brantford.
Cardinal	J. F. Carr	J. F. Harries	Cardinal.
Carleton Place	Wm. Findlay	J. A. McDiarmid	Carleton Place.
Cayuga	M. McConnell	Geo. L. Woltz	Cayuga.
Chatham	Jno. Glassford	W. McK. Ross	Chatham.
Chesterville	Miss H. Moad	A. E. Bolster	Chesterville.
Clifford	R. M. Hazlewood	Jno. R. Scott	Clifford.
Clinton	M. D. McTaggart	Thos. Cottle	Clinton.
Cobourg	E. W. Hayden	C. R. Gummow	Cobourg.
Dryden	Dr. Dingwall	Alex. Kennedy	Dryden.
Dundalk	Dr. F. Martin	W. T. Rundle	Dundalk.
Dundas	F. E. Lennard	Jas. A. Kyle	Dundas.
Durham	Jno. Morrison	Chris. Firth	Durham.
Elmira	C. P. Ruppel	C. W. Schierholtz	Elmira.
Elora & Salem	Wm. McPhee	W. O. Mendell	Elora.
Essex	L. L. Barber	Rev. H. Millar	Essex.
Fergus	Jno. Malcolm	J. C. Templin	Fergus.
Ford City	Jos. L. Reaume	Ulysses G. Reaume	Ford City.
Fort William	Paul Vanderkaa	Chas. W. Wilson	Fort William.
Galt	Edward Lane	R. S. Hood	Galt.
Goderich	Jno. Stratton	W. Lane	Goderich.
Grimsby	T. P. Jenkinson	W. B. Calder	Grimsby.
Guelph	R. E. Nelson	J. E. Britton	Guelph.
Haileybury	A. B. Cox	A. B. Iliffe	Haileybury.
Hamilton	Jno. A. Webber	Mrs. R. B. Potts, 15 Bruce St.	Hamilton.
Hanover	D. Luesing	Miss F. Kirchner	Hanover.
Hespeler	Theo. Buck	E. H. Birkin	Hespeler.
High Park	Albert Chamberlain	A. E. Whatmough	491 Keele St., Toronto.
Hillsburg	Mrs. Alex. Orr	Miss Z. Barbour	Hillsburg, R.R. 2.
Kingston	Lieut.-Col. A. E. Kent	A. W. McLean	Kingston.
Kingsville	W. E. Delany	J. E. Brown	Kingsville.
Lindsay	A. M. Fulton	Jas. Keith	Lindsay.
Listowel	J. M. Campbell	A. St. G. Hawkins	Listowel.
London	Wm. Hayden	A. M. Hunt	London.
Markdale	R. W. Ennis	Miss Florence Lemon	Markdale.
Midland	R. G. Nesbitt	Mrs. A. F. Bryant	Midland.
Millbrook	A. T. Armstrong	W. S. Given	Millbrook.
Milton	Robt. Stewart	Mrs. Thos. Dale	Milton.
Mitchell	Jos. Goforth	A. J. Blowes	Mitchell.
Napanee	E. J. Pollard	W. S. Herrington	Napanee.
Newcastle	Dr. McIntosh	Mrs. J. E. Matchett	Newcastle.
Oakville	W. S. Savage	L. V. Cote	Oakville.
Orangeville	Dr. R. N. Kyles	H. F. Tuck	Orangeville.
Orillia	Dr. A. P. Ardagh	Isaac Day	Orillia.
Oshawa	D. A. Valleau	Mrs. E. J. Jacobi	Oshawa.
Ottawa	R. J. Farrell	H. W. Jackson	195 Wallace St., Ottawa.
Owen Sound	Arthur Burt	Miss J. S. Maughan	Owen Sound.
Paris	W. N. Bell	Wm. Young	Paris.
Perth	Hy. Taylor	N. G. Dickson	Perth.
Peterborough	Walter Stocker	C. H. Williamson	Peterborough.
Picton	Jno. L. Graydon	Walter T. Ross	Picton.

PRESIDENTS AND SECRETARIES OF HORTICULTURAL SOCIETIES.—Continued.

Societies.	Presidents.	Secretaries.	Address.
Port Credit	A. W. Briggs	W. H. Arms	Port Credit.
Port Dover	Jno. Aldredge	Jno. Aldredge	Port Dover.
Port Hope	A. G. Aldrich, M.D.	W. T. Greenaway	Port Hope.
Richmond Hill	J. H. Dunlop	Walter H. Watson	Richmond Hill.
St. Catharines	W. B. Burgoyne	Mrs. Pirie Blain	St. Catharines.
St. Thomas	Dr. F. E. Bennett	R W. Johnson	St. Thomas.
Sandwich	Dr. W. J. Beasley	A. R. Marentette	Sandwich.
Sault Ste. Marie	J. W. LeB. Ross	W. B. Culbert	Sault Ste. Marie.
Seaforth	A. F. Cluff	A. D. Sutherland	Seaforth.
Smith's Falls	W. T. Ferguson	H. S. Hunter	Smith's Falls.
Stirling	Mrs. Bissonnette	Mrs. T. H. Matthews	Stirling.
Stratford	D. R. McPherson	S. R. McConkey	Stratford.
Strathroy	J. R. Smith	R. F. Richardson	Strathroy.
Streetsville	W. J. Graydon	Jno. Keir	Streetsville.
Thornhill	R. A. Nisbet	Miss M. Simpson	Thornhill.
Tillsonburg	V. A. Sinclair	H. Fairs	Tillsonburg.
Toronto	Frank Roden	O. St. Geo. Freer	59 Chelsea Ave., Toronto.
Walkerton	M. G. Dippel	Jas. Tolton	Walkerton.
Walkerville	C. D. Brown	W. H. Smith	Walkerville.
Waterloo	Robt. Simm	J. Uffelmann	Waterloo.
Westboro	T. B. Cole	Miss B. Davidson	68 Fifth St., Ottawa.
Weston	Jno. Dickin	J. M. Pearen	Weston.
Whitby	Rev. Jos. Fletcher	R. M. Tipper	Whitby.
Winchester	J. D. Stewart	E. N. Elliott	Winchester.
Windsor	Mrs. C. W. Cadwell	H. J. McKay	Windsor.
Woodstock	Hy. Inder	Jno. Whitehead	Woodstock.

REPORT

OF THE

Monteith Demonstration Farm

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1916

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WILLIAM BRIGGS
Corner Queen and John Streets
TORONTO

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.O., a Lieutenant-Colonel in the Militia of Canada, etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

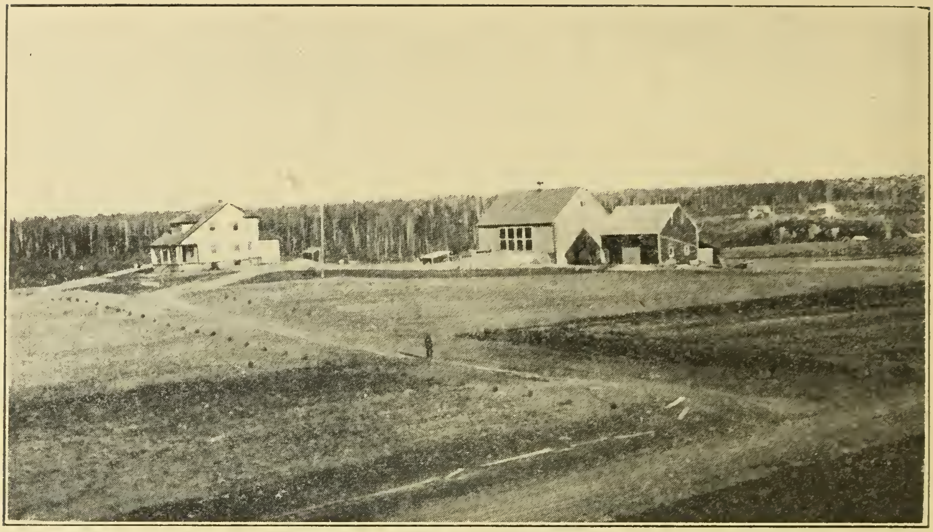
MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Report of the Monteith Demonstration Farm for 1915.

JAMES S. DUFF,

Minister of Agriculture.

TORONTO, 1916.



Monteith Farm Buildings.

Pure Red Clover in Coil on Monteith Farm.

MONTEITH DEMONSTRATION FARM.

1915.

To the Honourable the Minister of Agriculture:

SIR:

I have the honour to submit herewith the 1915 Report of the Monteith Demonstration Farm.

I am pleased to state that the work of the past year has been of a progressive character, and that the results should be of special value to the pioneer farmers of the north.

The demonstrations here have been carried on in a practical way under field conditions. Our Annual Demonstration Day was held on August 12th, when upwards of 1,500 people visited the Farm. Paths were made around and through the crops and people could be seen on all parts of the Farm looking over and studying the various demonstrations. During the day 2,500 lunches and six barrels of coffee were served free of charge.

The weather conditions for the year have been very favourable, and heavy yields of grain could be seen everywhere throughout Timiskaming. It is true we had wet weather in the fall, and much fall plowing was left undone on this account, but here we saw the value of growing early varieties of grain, especially oats. When early varieties are grown it gives the farmer a much better opportunity to get his fall work started in good time. Moreover, early varieties give the young clover a better chance to attain some size before the cold weather sets in. Early varieties are shorter in the straw, and thus it is much easier to get dry, and the result is a better sample of grain. The men who grew early varieties had ample time to harvest their crops under almost ideal conditions.

FIELD CROPS.

FALL WHEAT.

In the fall of 1914 three varieties of fall wheat were sown. This included Dawson's Golden Chaff, Winter King and Golden Jewel. The Dawson's Golden Chaff was divided into two plots, one plot with seed produced in Old Ontario while the other was sown with seed produced here on the Farm. Of the three varieties the Golden Chaff appeared to be slightly in the lead.

The home grown seed was apparently the best of all, yet very little difference could be seen. In all cases the sample was decidedly good. The kernels were large and plump. The average yield over the four plots was approximately thirty bushels per acre.

SPRING WHEAT.

We also tried a number of varieties of spring wheat, namely,—Marquis, Prelude, Red Fife, White Fife, and Goose. In general appearance of the standing crop the Red Fife seemed to take the lead. But the Fifes being long in the straw are late in maturing, and the Marquis and Prelude were earlier. The Prelude was fully two weeks earlier than any of the other varieties, and thus it was the only one that escaped the frost which came in August. It has a small head and is a poor yielder. We intend trying the Marquis another year. We are led to think that spring wheats are a little too late for this section. Our spring wheats have been frosted two successive years while our fall wheat has always done well.

SPRING RYE.

We tried some spring rye and found that it did very well with a fair yield. It matured about the same time as the Prelude wheat.

O.A.C. No. 21 BARLEY.

In the year of 1914 we had an exceptionally large yield of O.A.C. No. 21 barley. This year we had only a small field in barley. It was sown on spring plowing with the result that it was not uniformly good. It was at least all that we could expect from spring plowing. However, in threshing we found that the yield was nearly fifty bushels per acre, and the sample very good indeed. We had some other barley that came up in the clover, where barley had been grown the previous year. This was exceptionally good, with large long plump heads. This was carefully harvested and is being kept for seed.

Dawson's Golden Chaff Wheat, from home-grown seed.

PEAS.

Peas do well over the whole north country, but some varieties go too much to straw, with the result that they are often caught with the frost. We tried the Golden Vine and the Early Britain; both yielded well, but were not quite ripe when the frost came. Another year we intend to try the Prince Albert, the Marrowfat and Sippinaw. Some of these varieties ripened well north of Matheson. When peas are mixed with oats we find that they mature better than when sown alone.

OATS.

Only three varieties of oats were tried this year. The O.A.C. No. 72, the O.A.C. No. 3, and Garton's Record. The main crop on the Farm was the O.A.C. No. 72. It is a rather late oat, and while it matured here the year before we were a little doubtful whether it would do so again. It did splendidly here again, this year giving a large yield and standing up well all over the field.

Being a late variety, we had considerable difficulty in harvesting this oat. The straw is long and heavy, and takes considerable time to dry after being cut. In this way most of it was caught in the rainy weather, which started about September 15th.

The O.A.C. No. 3 was sown last and matured nearly two weeks earlier than either of the other varieties. We intend sowing it on a larger scale another year. We also tested the Garton's Record oat. It was sent into Timiskaming last year by the Government and it did very well here on the Farm this year, being a little earlier than the O.A.C. No. 72. The three varieties together averaged approximately 60 bushels per acre.

The O.A.C. No. 72 Oats in Shock at Monteith.

TREATING OATS FOR SMUT.

Practically all of our oats were treated for smut. We used formalin and water, one pint to 40 gallons. The bags of grain were immersed in a barrel of the solution for twenty minutes then spread out on a clean floor to dry, care being taken that the grain did not become re-infected after treating. The untreated portions of the field could readily be detected by an ordinary observer. It was variously estimated that the yield from the untreated seed was fully twenty per cent. less than the same grain treated.

THICKNESS OF SEEDING OATS.

Experiments to thickness of seeding were tried out, some being sown at the rate of two bushels per acre, some at two and a half and some at three bushels per acre. These were all side by side in the same field. From all appearances there was little or no difference. We have decided, however, to sow our main crop next year at the rate of two and a half bushels per acre and make another similar test.

GRAIN MIXTURES.

We mixed oats and peas at the rate of two bushels of oats to one of peas. This mixture did remarkably well. The sample was particularly good, and the yield was over seventy-five bushels per acre.

COMMON RED CLOVER.

We had one eighteen acre field of pure red clover which had been seeded in barley and oats the year before. It did exceedingly well. In looking the field over early in the spring one could not find the slightest indication of winter killing. This field yielded three tons of cured hay to the acre in the first cutting. The second growth was plowed under.

SOWING RED CLOVER MIXTURE.

The young clover sown in the spring with the grain came along well, but did not look as strong in the fall as in previous years. It was sown at different rates, ranging from ten to twenty pounds to the acre. We mixed twelve pounds of common red clover seed with three pounds of alsike and five of timothy. This was sown mostly at the rate of eighteen pounds per acre. In several places we reduced this amount by about a half. This will be interesting to watch another year.

SOWING GRASS SEED IN FORTY ACRES OF SLASHING.

Some red clover was sown on the shallow snow in April on new land that had been slashed and burned. It was a splendid catch, and provided considerable pasture in the late summer. Only two weeks later (after the snow had all gone) we seeded some thirty acres more of this same slashing, but no trace of the seed could be seen anywhere. As this experiment was carried out on a large scale, we believe that clover and grass seed of any kind should be sown on the shallow snow rather than in the mud or dry ground.

Some sweet clover was sown on the farm this year and the catch was fairly good. We hope to try this clover for ensilage for our silo another year. This sweet clover will be mixed with other clover, and possibly green oats and peas.

ALFALFA.

We have sown a few more acres to alfalfa. Part of the seed was secured from Alberta and part from Old Ontario. This kind of forage crops has done very well here on the farm so far, some of it going under the snow for the fourth time. We also produced some alfalfa seed this year.

ROOTS.

Of all crops in the north, roots seem to take the lead. Yet many crops of poor roots were seen throughout the district. This was owing to the fact that the ground had not been properly prepared. The ground should be well plowed in the fall and manured, if possible, with coarse strawy manure. A heavy application of manure, together with fall plowing, helps to open the clay and make it more pliable and porous. We had three patches of turnips this year sown at different times. Those that were sown first were the best. The best patch yielded very well, with nearly 1,000 bushels per acre by weight.

POTATOES.

We plowed our ground up well in the fall, and in the spring it was thoroughly cultivated to a depth of about five inches. We then plowed our potatoes in just as shallow as we could, but even so we buried them too deep and many of them never came up at all. Another year we intend to ridge up our potato ground in the fall. Some of them will be planted with a hoe on top of the drill, while others will be placed in a furrow.

Farm Visitors Standing in Oats Sown at the Rate of 2½ Bushels per Acre.

In all we had fourteen experiments in potatoes, including six different varieties. Taking last year into consideration with this we found that the Early Eureka and the Empire State were the two leading varieties.

Our potato seed was all cut, leaving at least two strong eyes in each set. In cutting potatoes we make use of an apple barrel, a butcher knife, and a narrow strip of a board. The strip is tacked on top of the barrel, the knife is run from the bottom up through the strip and the potatoes are shoved through the knife. The operator, using a pair of heavy gloves, finds this a particularly easy way of cutting potatoes.

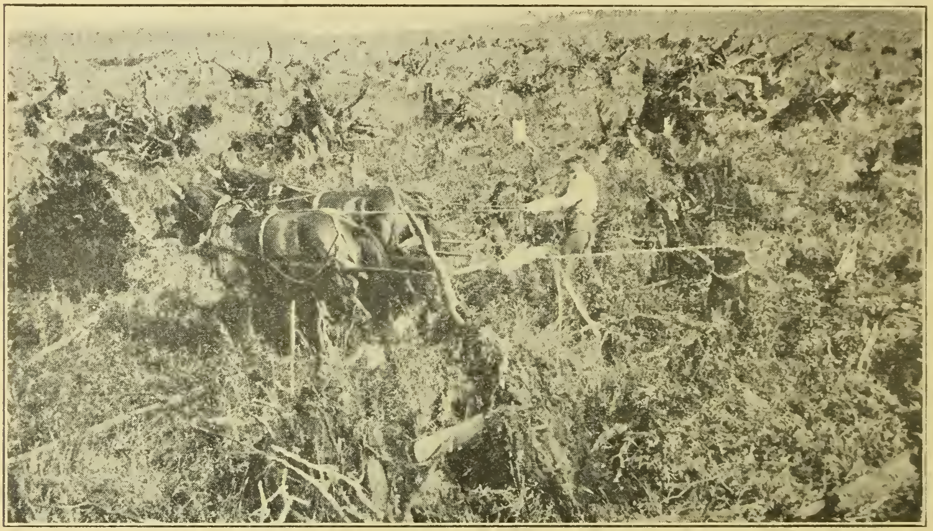
CULTIVATION.

In the fall of 1914 we conducted several experiments in plowing, using different plows. The single-disc plow, the deep-tilling disc plow, the single plow without a skimmer and the single plow with a skimmer were all used in the same field. According to our judgment the walking plow with a skimmer excelled in every case. Riding plows and plows with wheels are not very satisfactory in new land, and it is very doubtful whether they are as good in any land. We intend to dispose of both of ours in favor of the single plow.

We do nearly all our plowing in the fall, and we plow as deeply as we can, rarely ever less than six inches, and sometimes even eight and nine. If the black muck is thick we always try to turn up an inch or two of clay on top to mix with it. If the plow jumps out or nearly out, we stop the team, back up and make another try.

We begin plowing as soon after harvest as we can, and then if we have time we ridge this up again later on. By ridging the ground more surface is exposed to the action of the frost and thus the soil is made more open and porous. In this way we can easily make a soft, mellow seed bed in the spring.

We had forty-five acres under cultivation for crop production, and on this we harvested the following crop:—



Land Clearing. To cut the underbush and stump, this land cost $20 per acre.

	1915.	1914.
	bush.	bush.
Fall Wheat	30	65
Spring Wheat and Mixed Crop	50	50
Peas	15	27
Oats and Peas mixed	55	..
Barley, O.A.C. No. 21	50	200
Oats	900	350
Total	1,100	692
Turnips	1,500	300
Parsnips	50	..
Carrots	20	..
Potatoes	30	150
Total	1,600	450
	Tons.	Tons.
Red Clover Hay	50	28
Alfalfa Hay	2	2
Straw	20	7

LIVE STOCK.

CATTLE.

We have five pure-bred Shorthorn cows on the Farm which made such a creditable showing at the pail that we have entered them in the R. O. P. test. We expect that each cow will give considerably over five thousand pounds of milk in a year, and two of them have already given more than that in six months, thus we feel that they have done very well indeed for Shorthorns.

Experiments on the Farm indicate that here in the north country, where the best kinds of feed are not always readily available, more and better calves are raised when they are dropped after the cows have been on the grass for a few weeks at least. We try to have all our cows freshened between the first of June and the last of October. Generally speaking, a cow will give more milk when she calves in the fall than if she calves at any other time of year.

Potatoes Growing Fifty Miles West of Cochrane.

TABLE SHOWING CALF GAINS.

Name of Calf.	Pounds gained in 128 days.	Average daily gain in pounds.
Monteith Primrose	220	1.72
Monteith Irene	277	2.16
Monteith Rose	301	2.35
Monteith Duke	345	2.70

These four calves were born in the late spring after the cows had been on grass for a little while. They were fed by hand on fresh milk and green alfalfa hay, with fresh water available at all times. They were kept in the stable in a bright, clean box-stall away from the flies, and sprayed daily during fly season. Towards fall we began to add a little bran and chopped oats to the rations, and later on we added a fairly liberal amount of pulped turnips.

During the year three pure-bred Shorthorn bulls were sent out from the Farm to Live Stock Associations. Our imported dairy Shorthorn stock bull has not only bred our own cows, but his services have extended over the district as far as eight and ten miles in each direction. Over forty cows were bred to this sire for the nominal fee of fifty cents each.

HORSES.

Our imported mare was worked regularly in the bush last winter, and this spring she worked right along in the team until June 1st. On July 6th she produced a fine, big, strong foal weighing 148 pounds when dropped. He lived and has done well.

	Weight of Colt. Lbs.	Weekly gain in pounds. Lbs.
At birth	148	..
First week	172	24
Second week	195	23
Third week	218	23
Fourth week	244	26

Average gain per day 3.42 pounds, or about twenty-five pounds a week.

Although the mare worked during almost the whole of her gestation period, she was always well cared for and never at any time abused. The foal was taught to lead on the halter before he was a week old. He was led out with the mare when she went to the paddock.

The Clydesdale stallion kept at the Farm was travelled during the season by the Matheson Pure-Bred Live Stock Association. About forty members belong to this Association, and practically every member bred one or more mares. This stallion has been highly satisfactory in every way.

SHEEP.

We have fifteen Shropshire sheep on the Farm. They were turned out in the slashing early in the spring and remained there until the middle of November. They received no extra attention at all, although they were given some salt regularly.

The average yield of wool for two years has been ten pounds each.

SWINE.

We have no hog pens on the Farm as yet, and have not gone into hog raising very extensively. During the year we sold to settlers in the district six pure-bred Yorkshire boars and twelve pure-bred Yorkshire sows. They were sold at $5 each, and with them the settlers received a pedigree. Each purchaser was under a written agreement that he would keep his pig for at least two years for breeding purposes only. This stock was distributed all the way from New Liskeard to Cochrane.

Our imported stock boar was loaned to the Matheson Live Stock Association for the summer. During this time he was made the sire of a large number of young pigs. This should make a marked difference in the stock at Matheson.

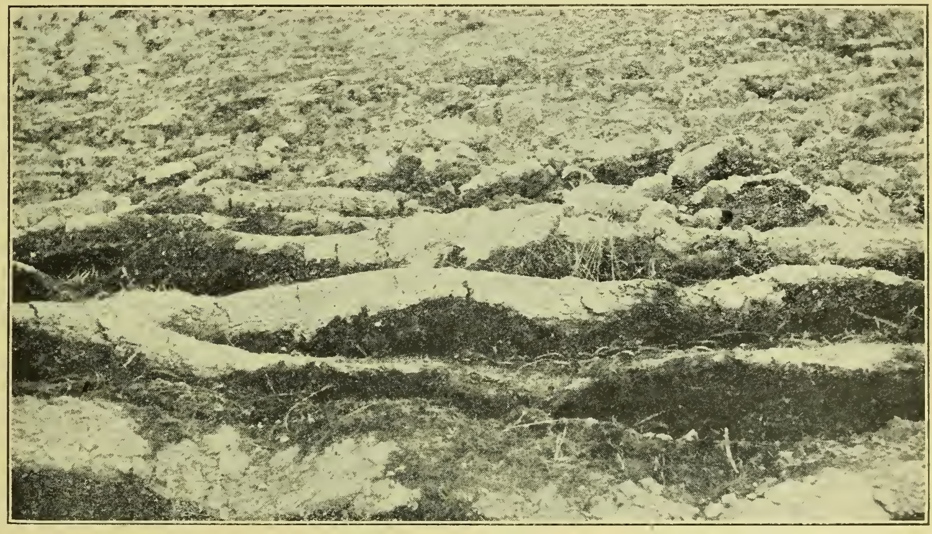
Most of the settlers throughout the district have not got good hog pens, and yet many of them are trying to raise two litters of pigs a year, with the result that their losses are very heavy. It would appear that the best time to have a sow farrow is in June, as in this way the young pigs have attained some size before the cold weather sets in in the fall.

POULTRY.

Our new breed called the New Ontarios seem remarkably well fitted to stand our northern climate. We keep an accurate account of all feed consumed and of all eggs and young stock produced during the year. In summing up we found that each hen made us a net revenue of $1.25. For some reason we had difficulty in hatching chickens, very many of the eggs being infertile. This new breed is large and heavy, with a small pea comb, white feathers and yellow legs. They lay a nice brown egg.

BEES.

Our bees were packed away outdoors in the fall. Three hives were placed together and well-dried sawdust to a depth of six inches packed around them. The entrance was pretty well closed, but kept free from snow all winter, as otherwise they might have smothered. They came out well in the spring, and the best hive was put on a scale and weights taken every night and morning all summer. This hive gathered over two hundred pounds of honey during the season.



Breaking Virgin Soil, showing Black Muck and Clay Formations.

Month.	Pounds of honey gathered. lbs.
June	28½
July	91½
August	68½
September	28
Total for season of 1915	216½

This same hive gathered one hundred and forty pounds of honey during 1914. Making a total of 356 pounds in two seasons.

FARM ACCOUNTING.

Beginning November 1st, 1914, we started a system of farm accounting. We did this in order to find out the actual cost of production. Each man makes out a daily report of what he has done, and hands this in at the office each Monday morning. All these reports are put together, and the number of hours spent on each job are put on record in a large book kept for the purpose. Thus we are in a position to tell exactly what each job costs. For instance, with the snow almost three feet deep we started work in the bush on January 24th with the following results:—

Cows in Pasture.

NINE ACRES OF GREEN BUSH.

Cost of	Logs 22,642 feet	Pulp 30 cords	Wood 50 cords	Total
Cutting	$36 88	$37 33	$28 77	$102 98
Skidding	28 58	31 24	11 82	71 64
Hauling	17 28	20 59	10 83	48 70
Making Roads	2 72	2 72	2 72	8 16
Slashing Refuse	....	....	....	28 77
Repairs	....	....	....	5 35
Total	$85 46	$91 88	$54 14	$265 60

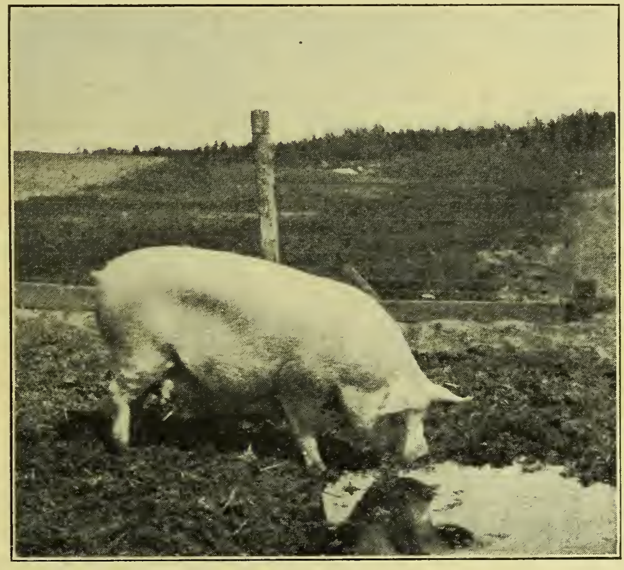
In a similar way we are enabled to figure out the cost of plowing, harrowing, seeding and harvesting per acre. In this way we can arrive at the actual cost of a bushel of grain. We know exactly how many hours it took to shock our grain, and how many hours it took to haul it in and thresh it, etc., etc.

Plowing new land cost	$6 65	per acre.
Rolling "	0 25	"
Discing "	0 37	"
Harrowing "	0 15	"

EQUIPMENT.

We have increased our equipment considerably since last year. In the past we have been obliged to water our stock at the river and this took up considerable time, especially in the winter. This year we drilled a well seventy-five feet deep. In drilling we went down through the clay and struck sand at a depth of forty feet, this sand became coarser as we went down, and at seventy-five feet we were in gravel. In testing the well the maximum flow was found to be a little less than four gallons a minute.

We purchased the section house lot near the railway to accommodate married help. We found our eight horsepower gasoline engine too light to do the threshing and chopping and we had it replaced by a twelve horsepower. We built a temporary driving shed, a root house and a seed granary. We took several hundred trees from our nursery and planted them around on the Farm, these included Manitoba maples, spruce and two kinds of pine. We have also cut and chopped fifty acres of bush and have one hundred acres more under contract at the present time. We have cleared over twenty acres of land, and have now seventy-three acres clear of stumps, with two hundred and fifty acres slashed.



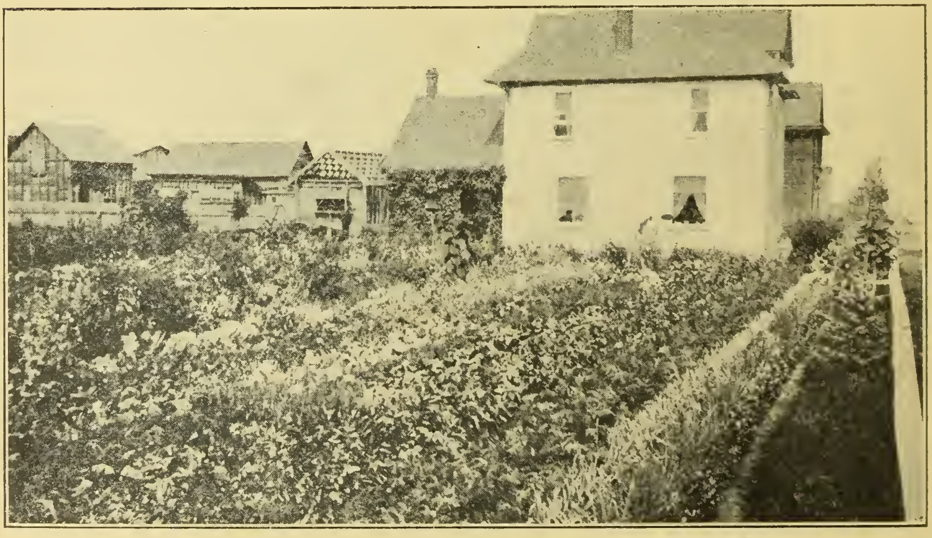
Yorkshire Sow. Four litters from this sow have been distributed throughout Timiskaming.

Apart from the actual management of the farm, I find my time devoted more and more each year to outside work. Farmers are looking to the farm for advice and assistance, and every effort is made to give them the benefit of our knowledge. The correspondence is getting very heavy and demands a considerable share of my attention. I have also acted as judge at a number of Fall Fairs, and have delivered addresses at Farmers' Clubs and similar agricultural gatherings.

R. H. CLEMENS,

Farm Director.

Monteith Union Church.



A New Liskeard Home.

ANNUAL REPORT

OF THE

FARMERS' INSTITUTES

OF THE

PROVINCE OF ONTARIO

1915

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
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1915

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TORONTO

KEY TO FARMERS' AND WOMEN'S INSTITUTE MEETINGS, 1915-16.

ANNOUNCEMENT OF MEETINGS :

	Regular		Supplementary	
	Page.	Division.	Page.	Division.
Addington	19	9	25	16
Brant, North	18	5	22	9
Brant, South	17	4	22	9
Bruce, Centre	16	1	20	1
Bruce, North	16	1	..	..
Bruce, South	16	1	21	4
Bruce, West	..	..	20	2
Carleton	19	11	25	18
Dufferin	..	..	23	13
Dundas	19	10	25	17
Durham, East	18	8	24	14
Durham, West	18	7	24	14
Elgin, East	17	3	22	8
Elgin, West	17	3	22	8
Essex, North	17	3	22	8
Essex, South	..	..	22	8
Frontenac	19	10	25	16
Frontenac, Centre	19	10	..	..
Glengarry	19	11	25	17
Grenville, South	19	10	25	17
Grey, Centre	..	..	20	2
Grey, North	..	..	20	2
Grey, South	..	..	21	4
Haldimand	17	4	..	..
Halton	16	1	23	13
Hastings, East	19	9	24	15
Hastings, North	..	..	25	16
Hastings, West	19	9	24	15
Huron, East	16	1	20	1
Huron, South	16	2	21	6
Huron, West	16	1	20	1
Kent, East	17	3	22	8
Kent, West	17	3	..	..
Lambton, East	..	..	21	5
Lambton, West	16	2	21	5
Lanark, North	19	10	25	18
Lanark, South	19	10	..	..
Leeds, South	19	10	25	16
Lincoln	17	4	22	10
Lennox	19	9	25	16
Middlesex, East	16	2	..	..
Middlesex, North	16	2	21	5
Middlesex, West	17	3	21	5
Monck	17	4	23	10
Norfolk, North	17	3	22	9
Norfolk, South	17	3	22	9
Northumberland, East	..	..	24	15
Northumberland, West	18	8	24	15
Ontario, North	18	7	24	14
Ontario, South	18	7	24	15
Oxford, North	..	..	..	..
Oxford, South	17	3	22	9

	Regular		Supplementary	
	Page.	Division.	Page.	Division.
Peel	..	..	23	12
Perth, North	16	2	21	6
Perth, South	16	2	21	6
Peterborough, East	18	8	24	15
Peterborough, West	18	8	24	15
Prescott	..	..	25	17*a*
Prince Edward	19	9	24	15
Renfrew, North	..	..	25	18
Renfrew, South	19	11	25	18
Russell	19	11	..	..
Simcoe, Centre	18	5	..	..
Simcoe, East	..	..	..	..
Simcoe, South	18	5	..	..
Simcoe, West	18	5	20	2
Stormont	19	11	25	17
Victoria, East	18	8	24	14
Victoria, West	18	8	24	14
Waterloo, North	..	..	..	..
Waterloo, South	..	..	..	..
Welland	17	4	23	10
Wellington, Centre	..	..	23	12
Wellington, East	18	5	..	..
Wellington, South	18	5	..	..
Wellington, West	18	5	23	12
Union	16	1	21	6
Wentworth, North	17	4	22	10
Wentworth, South	17	4	22	10
York, East	..	..	23	12-13
York, North	..	..	23	12
York, West	..	..	23	13

FARMERS' INSTITUTES OF ONTARIO

1915-16.

ANNOUNCEMENT OF SUPERINTENDENT.

This volume contains list of Farmers' and Women's Institute meetings to be held during the winter of 1915-16. There was some uncertainty as to the wisdom of planning for any considerable number of meetings to be held during the coming winter, but the keen interest shown on the part of our correspondents has resulted in plans being made for a considerable number of regular Institute meetings in addition to about the usual number of Short Courses in Live Stock Judging. It will be remembered that during the season of 1914-15 only a limited number of meetings were held. They were, however, more than usually successful and we look forward with confidence to well attended, profitable meetings this season. In addition to the regular Institute work, a better Farming Special was run over the C. P. R. lines, as reported upon below. With the Short Courses in Agriculture and other lines of work conducted by District Representatives, Short Courses in Stock Judging, Institute Meetings, Better Farming Coaches, and other special meetings, the Province should be well served along agricultural instruction lines this season.

It has been our aim to prevent overlapping in all this work, and we appeal to the Institute officers and directors to make the meeting in each locality as great a success as possible. We again express the opinion that Institute meetings cannot be made a success without the hearty co-operation of all concerned, not only in planning for and advertising the meetings, but in taking part in the discussions at the meetings.

The degree of interest shown on the part of the farmers in the series announced herein, will be a partial guide in making plans for further work of a similar character.

Reorganization of Farmers' Institutes.

It will be remembered that several months ago, in the early spring of 1915, a suggested plan for reorganization of Farmers' Institutes was submitted to the Institute officers and directors and others interested in agricultural instruction. It was intimated at the time that no change would be made in the rules and regulations governing the meetings to be held during the winter of 1915-16, so the series announced herein will be held in accordance with the regulations which have been in force for a number of years.

A large majority of those who expressed views regarding reorganization plans were favorable, and in practically all cases where slight opposition to and criticism of the regulations was shown the same was dispelled by a fuller explanation as to the methods outlined and the objects in view. The Department is still prepared to receive suggestions regarding plans for reorganization and will make full announcements at an early date as to the system to be adopted in the holding of meetings after the present season. Some helpful suggestions have been received and some slight changes will, no doubt, be made in the original suggested plan. The aim is to have an organization controlled by the farmers, but which will be representative of all interests in the community. The suggested plan will mean more liberal support of the Institute work by the Department of Agriculture than has been the case in the past. It will also provide for greater certainty in the matter of planning for meetings and in the advertising of the same. These two conditions are essential to success.

Encouragement will be given to the formation of Farmers' Clubs and other local agricultural organizations. Outlines of the suggested plan will be furnished on application.

WOMEN'S INSTITUTES.

The past fifteen months have seen a transformation in so far as the work of the Women's Institutes is concerned. For a number of years they have been devoting their attention to those problems directly concerning the home—food values and cooking, care and feeding of children, household sanitation, beautifying of homes both inside and outside, school problems, and community improvement—such as libraries, tree planting, parks, etc. Practically all such efforts have ceased, however, in the face of the larger call of Patriotism. The Institutes have, during the past fifteen months contributed in cash and goods to the amount of at least $200,000, and practically all the 860 branches with their 30,000 members are now devoting considerable time to raising funds, knitting, sewing and the making of hospital supplies—all for patriotic purposes. They are strong supporters of charity and patriotic efforts in their respective localities. The resourcefulness, industry and sacrifice of the Institute members in this trying time will be a lasting monument to one of the strongest organizations in the Province.

The Conventions at Ottawa, London and Toronto, held in the latter part of October and early November were most successful, the addresses inspiring, the enthusiasm most marked, and unbounded confidence was shown as to further effective service along patriotic, educational, and community betterment lines. A full report of the work of the Women's Institutes for the year will soon be available and may be had upon application.

BETTER FARMING SPECIAL.

In co-operation with the Canadian Pacific Railway the Provincial Department of Agriculture equipped a couple of demonstration cars which were utilized by a staff of instructors in giving lectures and demonstrations at the places named below:

Place.	Day	Date
Claremont	Monday	Oct. 4th.
Burketon Jct.	Tuesday	Oct. 5th.
*Blackstock	Tuesday	Oct. 5th
Tweed	Wednesday	Oct. 6th.
Apple Hill	Thursday	Oct. 7th.
Finch	Friday	Oct. 8th.
Winchester	Saturday	Oct. 9th.
Kemptville	Monday	Oct. 11th.
Merrickville	Tuesday	Oct. 12th.
Carleton Place	Wednesday	Oct. 13th.
Stittsville	Thursday	Oct. 14th.
Perth	Friday	Oct. 15th.
Norwood	Saturday	Oct. 16th.
Lindsay	Monday	Oct. 18th.
Coldwater	Tuesday	Oct. 19th.
Craighurst	Wednesday	Oct. 20th.
Alliston	Thursday	Oct. 21st.
Tottenham	Friday	Oct. 22nd.
Bolton	Saturday	Oct. 23rd.
Shelburne	Monday	Oct. 25th.
Chatsworth	Tuesday	Oct. 26th.
Owen Sound	Wednesday	Oct. 27th.
Flesherton	Thursday	Oct. 28th.
Orangeville	Friday	Oct. 29th.
Brampton	Saturday	Oct. 30th
Elmira	Monday	Nov. 1st.
Goderich	Tuesday	Nov. 2nd.
Milverton	Wednesday	Nov. 3rd.
Guelph	Thursday	Nov. 4th.
Ayr	Friday	Nov. 5th.
Tillsonburg	Saturday	Nov. 6th.
Belmont	Monday	Nov. 8th.
Thamesford	Tuesday	Nov. 9th
Komoka	Wednesday	Nov. 10th.
Appin	Thursday	Nov. 11th.
Kent Bridge	Friday	Nov. 12th.
Chatham	Saturday	Nov. 13th.
Tilbury	Monday	Nov. 15th.
Woodstock	Tuesday	Nov. 16th.

*Aft. and Eve. lectures.

One of the cars contained the following stock:

1 Clyde Mare.
1 Percheron Mare.
1 Holstein Cow.
1 Ayrshire Cow.
1 Dual Purpose Short Horn Cow.
3 Shropshire Sheep.
3 Cotswold Sheep.
3 Berkshire Hogs.
3 Yorkshire Hogs.

The other car contained exhibits bearing upon:

Grains, Grasses and Fodder Crops.
Drainage and Protection from Lightning.
Dairying.
Poultry Raising.
Weeds—identification, methods of destruction, etc.

The programme provided for the public to visit the cars any time during the day, usually between 9.30 a.m. and 5.30 p.m. Special invitations were given to the larger pupils in the schools to visit the train, and the instructors in charge were prepared at all times to give brief addresses upon the various exhibits and to answer questions. In the afternoon, demonstrations in the judging of live stock were given, usually from 2 or 2.30 to 4.30 or 5 o'clock. At a number of centres some of the best live stock in the locality was compared with the stock on the train and formed the basis for the giving of valuable instruction. The evening meetings were devoted almost entirely to an exhibition of moving pictures, illustrative of up-to-date agriculture and bearing upon health problems. The Provincial Board of Health co-operated in this work, providing some of the films and an operator. Much interest was shown in these views by townspeople as well as the farmers and their families.

On account of the exceptionally heavy crops and the difficulty in getting farm work done with despatch on account of excessive wet in the late summer and early fall, it was at considerable inconvenience that the farmers attended meetings of any kind during October and early November. The number who took advantage of the train was gratifying, and, while at some points not many farmers were reached, the instructors considered that a splendid service was rendered at all points by the information imparted to the larger boys and girls at the schools.

Special sessions for the women were planned for the afternoons, and a regular Women's Institute lecturer was assigned for the occasion. At a number of points where moving pictures could not be shown on account of not having electrical power, addresses were given at the evening meetings by the lady lecturer as well as the instructors on the train. The operation of these two coaches, together with similar work undertaken in former years demonstrates beyond a doubt that this can be made a most valuable feature in connection with agricultural instruction.

ATTENDANCE, MEMBERSHIP, ETC., FOR 1914-15.

The number of meetings held was about one-third of the average for a number of years past, due to unusual conditions created by the war.

Institutes having the largest attendance at their meetings:—

Middlesex, East	1,552
Lincoln	1,442
Parry Sound, East	1,363
Welland	1,205
Waterloo, North	1,152
Huron, East	1,074
Nipissing, West	1,072
Wellington, West	1,030
Bruce, South	977
Manitoulin, West	966
Huron, West	960
Simcoe, Centre	949
Wellington, East	911
Timiskaming,	830
Northumberland, West	810

Institutes with the largest membership for the year ending May, 1915:—

Perth, South	554	Lambton, East	361
Waterloo, North	503	Dufferin	367
Halton	464	Huron, East	323
Brant, South	438	Brant, North	319
Waterloo, South	429	Lincoln	316
Simcoe, Centre	414	Peel	307
Welland	382	Durham, East	303
Middlesex, North	368	Middlesex, East	287

JUDGING CLASSES.

Short Courses in Seed and Stock Judging were conducted between Nov. 16 and March 10, 1914-15, at the following places: Appin, Arnprior, Avonmore, Bell's Cors., Bainsville, Beachburg, Binbrook. Blackstock. Brampton, Bridgenorth, Brockville, Brookville, Brougham, Burnaby, Caledon, Cannington, Cardinal, Clachan, Comber, Courtland, Dunsford, Dutton, Enterprise, Essex, Galt, Georgetown, Glenmorris, Glen Nevis, Grand Valley, Harley, Hawkesville, Hickson, Hornings Mills, Inkermann, Kinburn, Laurel, Lyons, Millbrook, Morewood, Mt. Albert, Mt. Pleasant, Nelson, New Dundee, Newington, Oakwood, Oil Spring, Orono, Picton, Poplar Hill, Port Perry, Postville, Princeton, Reaboro, Renfrew, Rockford, Rockton, Roseneath, Seeley's Bay, Selkirk, Schomberg, Sharbot Lake; Sillsville, St. Mary's, Toledo, Vanessa, Warsaw, Waterloo, Wilkesport, Wooler, York and Zephyr—71 in all.

ANNUAL MEETINGS.

During the past season speakers were sent to 31 annual meetings of the Farmers' Institutes.

DAIRY MEETINGS.

The staff of Dairy Instructors employed regularly from April to November each year are utilized also to attend special Dairy Meetings held under the auspices of the factories and creameries, usually at the time of the annual business meeting. Speakers were sent to 232 such meetings during the past year, and the total attendance was 11,506.

MEETINGS IN NORTHERN ONTARIO.

The Farmers' and Women's Institutes in the northern sections of the Province were furnished with lady and gentlemen speakers for a series of meetings held in late May, June and early July. The total number of such meetings was 130.

SUMMARY OF ATTENDANCE.

At regular, supplementary, and special Institute meetings for the twelve months ending June 30, 1915:—

Regular and Supplementary Meetings:	
Farmers' Institutes	48,182
Women's Institutes	224,210
Special Institutes:	
Women's Institute Demonstration Lectures	8,859
Farmers' and Women's Institute Conventions	14,500
Seed and Live Stock Judging Classes	16,883
Cheese Factory and Creamery Meetings	11,506
Total	324,140

Statistical Report.

On account of the unusual conditions prevailing during the season of 1914-15, the statistical statement for some of the Institutes is not complete and, of course, presents an unfair comparison with other years. It has been decided, therefore, to give only totals in presenting the statistics for the current year.

Membership for the year 1915	18,750
Number of meetings held	581
Total Attendance	48,182

Cash on hand and total receipts	$11,899 20
Expenditure	6,796 65
Balance carried forward	5,102 55

While the number of meetings held was slightly over one-third of the number held the year before, the attendance is a little over one-half what it was in 1913-14.

GEO. A. PUTNAM,
Superintendent.

ONTARIO FARMERS' INSTITUTES

OFFICERS FOR 1915-16.

Institute.		Name.	Address.
Addington	President	W. H. Vannest	Enterprise.
	Vice-President	Robt. Nugent	Newburgh.
	Secretary	A. A. Jackson	Enterprise.
Algoma, Centre	President	G. W. Hill	R. R. 1, Sault Ste. Marie.
	Vice-President	Hugh Triplett	R.R. 1, Sault Ste. Marie.
	Secretary	Henry Knight, Jr.	R.R. 1, Sault Ste. Marie.
Algoma, East	President	Thos. Cordukes	Sowerby.
	Vice-President	Duncan McLennan	Livingstone Crk.
	Secretary	A. H. Hagen	Sowerby.
Algoma, North Shore	President	Albert Davidson	MacLennan.
	Vice-President	Alex. McCluskie	MacLennan.
	Secretary	James Nott	MacLennan.
Brant, North	President	Judson Rosebrugh	St. George.
	Vice-President	Harry Nixon	St. George.
	Secretary	A. W. Pate	R.R. 4, Paris.
Brant, South	President	G. M. Ballachey	113 Brant Ave., Brantford.
	Vice-President	Jno. M. McKinnon	R.R. 1, Burford.
	Secretary	F. E. Malcolm	R.R. 2, Brantford.
Bruce, Centre	President	J. L. Bowers	Ripley.
	Vice-President	Jno. Watson	Pine River.
	Secretary	R. J. Nelson	Paisley.
Bruce, North	President	J. K. Livingston	Hepworth.
	Vice-President	Wm. Laidlaw	Lion's Head.
	Secretary	Cecil Swale	Wiarton.
Bruce, South	President	Jas. A. Lamb	R.R. 1, Walkerton.
	Vice-President	S. D. A. A. Stobo	R.R.3, Teeswater.
	Secretary	W. A. Rowland	R.R. 1, Walkerton.
Bruce, West	President	Neil McDougald	Tara.
	Vice-President	J. B. Muir	Pt. Elgin.
	Secretary	J. H. Wismer	Pt. Elgin.
Carleton	President	Geo. Hopper	Merrivale.
	Vice-President	A. H. Acres	Hazeldean.
	Secretary	R. H. Grant	Hazeldean.
Dufferin	President	R. Hill	R.R. 4, Shelburne.
	1st Vice-President	R. H. Galbraith	R.R. 2, Shelburne.
	2nd Vice-President	R. Fawsett	R.R. 4, Shelburne.
	Secretary	Jas. H. McKee	R.R. 3, Shelburne.
Dundas	President	S. D. Thorpe	No. 1, South Mountain.
	Vice-President	Mahlon Beckstead	No. 1, Chesterville
	Secretary	W. H. Casselman	Chesterville.
Durham, East	President	W. R. Shields	Mount Pleasant.
	Vice-President	S. S. Staples	Ida.
	Secretary	A. J. Fallis	R.R. 3, Millbrook.
Durham, West	President	John Baker	Solina.
	Vice-President	W. L. Smith	Orono.
	Secretary	W. E. Pollard	Bowmanville.
	Asst.-Secretary	A. W. Annis	Tyrone.
Elgin, East	President	R. A. Penhale	R.R. St. Thomas.
	Vice-President	J. H. Sheppard	R.R., Aylmer.
	Secretary	F. Leeson	Aylmer.
Elgin, West	President	A. A. Miller	Middlemarch.
	Vice-President	H. McPhail	Dutton.
	Secretary	J. E. Pearce	Wallacetown.

Institute.		Name.	Address.
Essex, North	President	K. J. Wilson	Maidstone.
	Vice-President	Edw. McPharlin	Essex.
	Secretary	M. N. Mousseau	South. Woodslee.
Essex, South	President	Philip C. Fox	Kingsville.
	Vice-President	Nelson Peterson	Ruthven.
	Secretary	G. W. Coatsworth	Kingsville.
Frontenac	President	E. Stover	Glenvale.
	Vice-President	D. C. Rogers	R.R. 1, Kingston.
	Secretary	J. S. Sibbit	R.R. 1, Kingston.
Frontenac, Centre	President	W. W. Barr	Mt. Grove.
	Vice-President	J. N. Smith	Parham.
	Secretary	A C. Abbott	Mt. Grove.
Glengarry	President	D. H. Kennedy	R.R. 1, Maxville.
	Vice-President	J. J. Calder	Lancaster.
	Secretary	J. P. McNaughton	Maxville.
Grenville, South	President	Joseph Goodin	Spencerville.
	Vice-President	Thos. Wallace	Spencerville.
	Secretary	Geo. W. Carson	R.R. 1, Domville.
Grey, Centre	President	Ben. Carruthers	Kimberley.
	Vice-President	Robt. Best	Flesherton.
	Secretary	J. I. Graham	R.R. 4, Markdale.
Grey, North	President	Malcolm Rutherford	Leith.
	Vice-President	Jas. Sutherland	Bognor.
	Secretary	A. S. Donald	R.R. 5, Tara.
Grey, South	President	J. W. Blyth	Varney.
	Vice-President	R. T. Edwards	No. 6, Markdale.
	Secretary	Geo. Binnie	No. 2, Priceville.
Haldimand	President	Steven Culver	R.R. 3, Byng.
	Vice-President	A. Lamb	Selkirk.
	Secretary	W. S. Dunnet	Lythmore.
Halton	President	Jas. H. Wilson	Milton.
	Vice-President	H. T. Foster	Burlington.
	Secretary	A. L. MacNab	Milton.
Hastings, East	President	Elisha Maynes	Thomasburg.
	Vice-President	Clarence Long	Blessington.
	Secretary	H. S. Tucker	Tweed.
Hastings, North	President	W. E. Tummon	Crookston.
	Vice-President	James Kincaid	Madoc.
	Secretary	F. A. Comerford	Eldorado.
Hastings, West	President	Clem. H. Ketcheson	R.R. 2, Belleville.
	Vice-President	W. E. Vanderwater	R.R. 2, Belleville.
	Secretary	T. H. Ketcheson	R.R. 2, Belleville.
Huron, East	President	Amos Smith	Trowbridge.
	1st Vice-President	Richard Proctor	R.R. 5, Brussels.
	2nd Vice-President	P. S. McEwen	R.R. 1, Bluevale.
	Secretary	P. A. McArthur	R.R. 1, Ethel.
Huron, South	President	Alex. Buchanan, Jr.	Hensall.
	Vice-President	Geo. Penhale	Exeter.
	Secretary	A. H. Doupe	R.R. 3, Exeter.
Huron, West	President	J. A. Mallough	R.R. 3, Auburn.
	Vice-President	J. W. Salkeld	Goderich.
	Secretary	Wm. Bailie	R.R. 3, Auburn.
Kent, East	President	Daniel Buchanan	R.R. 2, Thamesville.
	Secretary	D. M. Winter	R.R. 3, Northwood.
Lambton, East	President	Jacob Willsie	Thedford.
	Secretary	Alex. Jamison	Forest.
Lambton, West	President	W. A. Brock	Petrolea.
	Vice-President	C. C. Hutchison	Corunna.
	Secretary	Robt. J. White	Mooretown.
Lanark, North	President	J. C. Currie	Lammermoor.
	Vice-President	Wm. Dunlop	McDonald's Cors.
	Secretary	Jas. Park	Poland.
Lanark, South	President	Jas. W. Leaver	Perth.
	Vice-President	W. T. Hands	R. M. 1, Perth.
	Secretary	Geo. Oliver	R. M. 5, Perth.

Institute.		Name.	Address.
Leeds, South	President	C. F. Rath	Lansdowne.
	Vice-President	Ephraim Vanderhoof	Westport.
	Secretary	Wm. J. Webster	Lansdowne.
Lennox	President	Ira B. Hudgins	Selby.
	Vice-President	M. A. Parrott	Odessa.
	Secretary	Manly Jones	Napanee.
Lincoln	President	L. H. Collard	R.R. 4, St. Catharines.
	Vice-President	A. H. Christian	Beamsville.
	Secretary	H. W. Houser	Campden.
Manitoulin, East	Secretary	Maurice I. Johnston	Big Lake.
Manitoulin, West	President	Nelson Campbell	Foxey.
	Vice-President	Jno. Jennings	Barrie Island.
	Secretary	Jno. B. Gibson	Foxey.
Middlesex, East	President	D. Black	Dorchester.
	Vice-President	W. Pack	Lambeth.
	Secretary	Jas. H. Wheaton	Thorndale.
Middlesex, North	President	Peter Mitchell	Ilderton.
	Vice-President	H. C. McDonald	Strathroy.
	Secretary	M. Veitch	Parkhill.
Middlesex, West	President	Martin Johnson	R.R. 3, Appin.
	Vice-President	Jno. M. Beckton	Glencoe.
	Secretary	Chas. M. Macfie	Appin.
Monck	President	F. Mingle	St. Ann's.
	Vice-President	Jno. Hill	Canboro.
	Secretary	J. E. Cohoe	Wellandport.
Muskoka, Centre	President	Alfred Kay	Port Sydney.
	Vice-President	W. J. Hamilton	Raymond.
	Secretary	J. H. Osborne	Utterson.
Muskoka, North	President	R. J. S. Hill	Hillside.
	Vice-President	Eli Leech	Huntsville.
	Secretary	F. A. Emberson	Hillside.
Muskoka, South	Hon. President	J. J. Beaumount	Bracebridge.
	President	H. E. Beaumount	Bracebridge.
	Vice-President	J. Byron Kaye	Bracebridge.
	Secretary	G. W. Miller	Gravenhurst.
Norfolk, North	President	Geo. Erwin	Simcoe.
	1st Vice-President	Theo. Cunningham	Windham Cen.
	2nd Vice-President	David Duckworth	Waterford.
	Secretary	Albert Swinn	Tillsonburg.
Norfolk, South	President	John Pow	Vittoria.
	Vice-President	Ed. Starling	R. R., St. Williams.
	Secretary	N. S. Palmerton	Walsh.
Northumberland, East	President	Geo. Anderson	R.R. 3, Campbellford.
	Vice-President	J. N. Stone	Norham.
	Secretary	J. A. Stewart, Jr.	R.R. 3, Campbellford.
Northumberland, West	President	F. J. Slade	R.R. 1, Fenella.
	Vice-President	W. J. Westington	R.R. 6, Cobourg.
	Secretary	Thos. Hoskin	R.R. 1, Grafton.
Ontario, North	President	James Arnold	Zephyr.
	1st Vice-President	Donald McKay	R.R. 1, Brechin.
	2nd Vice-President	Rev. J. McK. McLennan	Beaverton.
	Secretary	Thos. Feasby	Uxbridge.
Ontario, South	President	Warren C. Willson	Brougham.
	Vice-President	Norman J. White	R.R. 1, Myrtle.
	Secretary	R. M. Tipper	Whitby.
Oxford, South	President	J. E. Cohoe	Burgessville.
	Vice-President	Jas. Griffin	Otterville.
	Secretary	B. G. Palmer	Norwich.
Parry Sound, East	President	Jno. Paget	Sundridge.
	1st Vice-President	G. E. Gibbon	Sundridge.
	2nd Vice-President	Jas. Cole	South River.
	Secretary	J. Harper	Sundridge.

Institute.		Name.	Address.
Peel	President	Ralph Crawford	Brampton.
	1st Vice-President	F. I. Thomson	Britannia.
	2nd Vice-President	Howard Jaffary	Macville.
	Secretary	Geo. Downey	Bolton.
Perth, North	President	R. Armstrong	Wartburg.
	Vice-President		
	Secretary	Duncan Forbes	143 Elizabeth St., Stratford.
Perth, South	President	Dougald McDougal	Mitchell.
	Vice-President	Robert Norris	Staffa.
	Secretary	Duncan MacVannel	St. Mary's.
Peterboro', East	President	E. Hawthorne	Warsaw.
	Vice-President	F. E. Birdsall	1st Contingent, France.
	Secretary	Chas. O'Reilly	Norwood.
Peterboro', West	President	J. A. McGregor	R.R. 2, Peterboro.
	1st Vice-President	Clayton Hanbridge	Stewart's Hall.
	2nd Vice-President	Clayton Telford	R.R. 1, Peterboro.
	Secretary	Allan B. Mann	R.R. 4, Peterboro.
Prescott	Secretary	Jas. Allison	Vankleek Hill.
Prince Edward	President	Peter Collier	South. Bay.
	Vice-President	Col. Angus Lighthall	Picton.
	Secretary	A. M. Platt	Picton.
Rainy River	President	A. D. Whiddon	Devlin.
	Vice-President	Isaac Fearron	Barwick.
	Secretary	T. A. Boucher	Emo.
Renfrew, North	President	O. Wright	Westmeath.
	Vice-President	Geo. Forbes	Beachburg.
	Secretary	Wm. Headrick	Beachburg.
Renfrew, South	President	X. Plaunt	Northcote.
	1st Vice-President	J. B. McLaren	R.R. 1, Renfrew.
	2nd Vice-President	J. B. Ferguson	Renfrew.
	Secretary	G. MacIntyre	R.R. 1, Renfrew.
Simcoe, Centre	President	Henry Priest	Anten Mills.
	Vice-President	H. G. Murdock	Wyevale.
	Secretary	Henry Priest (pro tem)	Anten Mills.
Simcoe, East	President	R. A. Lehmann	Orillia.
	Vice-President	Walter Forrester	R.M.D., Hawkestone.
	Secretary	R. C. Hipwell	Orillia.
Simcoe, South	President	I. N. Morton	Lefroy.
	Vice-President	Jas. Stephens	Newton Robinson.
	Secretary	J. A. Kidd	Cookstown.
Simcoe, West	Hon. President	John McKee	Duntroon.
	President	Robt. Macham	New Lowell.
	1st Vice-President	Jno. Smith	Duntroon.
	2nd Vice-President	Robt. Murray	Avening.
	Secretary	J. A. McDermid	Batteau.
Stormont	President	Felix McLaughlin	Avonmore.
	Vice-President	A. T. Shaver	Lunenburg.
	Secretary	D. H. McDiarmid	R.R. 2, Moose Creek.
Timiskaming	President	Jos. Henderson	Milberta.
	Vice-President	T. J. Norris	Thornloe.
	Secretary	W. G. Nixon	Slate River.
Thunder Bay	President	Jno. Edmonds	Dorion.
	Vice-President	Robert McKenzie	Murillo.
	Secretary	A. W. Trewin	Slate River.
Victoria, East	President	Isaac Fee	R.R. 2, Omemee.
	Vice-President	Isaac Naylor	R.R. 1, Cameron.
	Secretary	Wm. Thurston	Bobcaygeon.
Victoria, West	President	Albert Davidson	Little Britain.
	Vice-President	John Cullis	Oakwood.
	Secretary	James Keith	Lindsay.

Institute.		Name.	Address.
Waterloo, North	President	Jas. H. Woods	No. 2, Elmira.
	1st Vice-President	J. A. Steiss	Heidelberg.
	2nd Vice-President	J. C. McKay	No. 1, Wallenstein.
	Secretary	Angus Weber	Floradale.
Waterloo, South	President	Wm. Elliott	R.R. 7, Galt.
	1st Vice-President	Sam. Cassel	New Hamburg.
	2nd Vice-President	A. C. Becker	Roseville.
	Secretary	Wm. J. Douglas (pro tem)	Galt.
Welland	President	Jas. C. Baker	Stevensville.
	Vice-President	H. H. Beam	Black Creek.
	Secretary	W. H. Gainer	Welland.
Wellington, Centre	President	Thos. W. Smith	R.R. 4, Belwood.
	Vice-President	James A. Goodall	Belwood.
	Secretary	Clarence T. Gerrie	Belwood.
Wellington, East	President	Donald McQueen	Mt. Forest.
	Vice-President	T. B. Farrell	Arthur.
	Secretary	Talbert Ferguson	Conn.
Wellington, South	President	Samuel Young	R.R. 2, Guelph.
	1st Vice-President	T. J. Mahon	Aberfoyle.
	2nd Vice-President	A. F. Auld	R.R. 2, Guelph.
	Secretary	J. A. Cockburn	Aberfoyle.
Wellington, West	President	T. Hammond	Moorefield.
	Vice-President	W. T. Whale	Goldstone.
	Secretary	E. G. Henry	Drayton.
Union	President	Jno. Pritchard	R.R. 1, Gorrie.
	Vice-President	D. Campbell	R.R. 1, Clifford.
	Secretary	Jno. R. Scott	Clifford.
Wentworth, North	President	Edwin McKnight	Rockton.
	1st Vice-President	Roland Cummins	Millgrove.
	2nd Vice-President	Watson McMonies	Waterdown.
	Secretary	Alfred Purnell	R.R. 3, Puslinch.
Wentworth, South	President	Austin Smuck	R.R. 3, Glanford Station.
	1st Vice-President	Jno. Mitchell	Stoney Creek.
	2nd Vice-President	G. E. Smith	R.R. 1, Jerseyville.
	Secretary	W. S. Patterson	Stoney Creek.
York, East	President	H. K. Clark	Agincourt.
	Vice-President	P. W. Burton	Eglinton.
	Secretary	Jas. T. Stewart	Agincourt.
York, North	President	T. H. Legge	Temperanceville.
	Vice-President	Wm. G. Hill	Queensville.
	Secretary	Wm. Dunning	Aurora.
York, West	President	Ed. Stonehouse	R.R. 1, Weston.
	Vice-President	John Jackson	Elia.
	Secretary	R. L. Crawford	R.R. 2, Weston.

DISTRICT REPRESENTATIVES OF THE DEPARTMENT OF AGRICULTURE.

District Representatives of the Provincial Department of Agriculture are stationed as indicated below. In nearly all of the Counties named plans have been made for conducting Short Courses in agriculture, extending from four to six weeks, in January and February. It will be impossible, in the majority of Counties, for the Representative or his Assistant to attend many of the Institute meetings. They will attend, however, when possible. The Representatives have been asked to notify the secretaries of the Institutes as to the meetings which they will attend, and an opportunity should be given the Representative to place his work before those in attendance at the meeting, if he so desires, and in many cases the Representative will be able to give instruction upon some definite line of agriculture of interest to the community. Where arrangements can be made with the Representative to attend a meeting before the bills are gotten out, announcement should be made accordingly.

District.	*Representatives.*	*Address.*
Algoma	A. S. Smith	Sault Ste. Marie.
Brant	R. Schuyler	Paris.
Bruce	N. C. MacKay	Walkerton.
Carleton	W. D. Jackson	Carp.
Dufferin	H. A. Dorrance	Orangeville.
Dundas	E. P. Bradt	Morrisburg.
Durham	R. S. Duncan	Port Hope.
Elgin	C. W. Buchanan	Dutton.
Essex	J. W. Noble	Essex.
Frontenac	J. W. Stark	Sydenham.
Glengarry	D. E. MacRae	Alexandria.
Grenville	J. E. McRostie	Kemptville.
Grey	H. C. Duff	Markdale.
Haldimand	G. L. Woltz	Cayuga.
Halton	H. R. Hare	Burlington.
Hastings	A. D. McIntosh	Stirling.
Kenora	P. Stewart	Kenora.
Kent	R. B. Hinman	Chatham.
Lambton	G. G. Bramhill	Petrolea.
Lanark	P. S. D. Harding	Perth.
Leeds	W. H. Smith	Athens.
Lennox & Addington	G. B. Curran	Napanee.
Manitoulin	I. F. Metcalf	Gore Bay.
Middlesex	I. B. Whale	London, Box 663.
Muskoka and Parry Sound	F. C. Paterson	Huntsville.
Norfolk	Geo. Wilson	Simcoe.
Northumberland	R. S. Beckett	Brighton.
Ontario	R. M. Tipper	Whitby.
Oxford	G. R. Green	Woodstock.
Peel	J. A. Carroll	Brampton.
Peterborough	F. C. McRae	Norwood.
Prince Edward	A. P. McVannel	Picton.
Rainy River	H. M. McElroy	Emo.
Renfrew	M. H. Winter	Renfrew.
Simcoe	J. Laughland	Collingwood.
Sudbury	H. B. Roy	Sudbury.
Temiskaming	W. G. Nixon	New Liskeard.
Thunder Bay—		
Fort William Section	G. W. Collins	Fort William.
Port Arthur Section	L. M. Davis	Port Arthur.
Victoria	A. A. Knight	Lindsay.
Waterloo	J. S. Knapp	Galt.
Welland	R. Austin	Welland.
Wentworth	R. L. Vining	Hamilton, 7 Market St.
York	J. C. Steckley	Newmarket.

INSTITUTE MEETINGS AND DELEGATES THEREFOR, 1915-16.

It is usual to have afternoon and evening sessions at each place, the former at 2.00, and the latter at 7.30 or 8.00 o'clock. The exact hour of meeting is decided by the officers of the Institute concerned, and announcements made accordingly. "Aft." indicates an afternoon meeting only; "Evg.," an evening meeting only. Arrangements will be made for a separate session for the ladies in the afternoon, and a joint meeting of the Farmers' and Women's Institutes in the evening, at those places for which a lady speaker is announced.

REGULAR MEETINGS.

Division 1.

A. R. G. Smith, New Hamburg, Jan. 6th to 25th.
J. M. McCallum, Shakespeare, Jan. 24th and 25th.
Mrs. R. L. Moorehouse, Cairo, Jan. 6th to 24th.

1	Hepworth, Down's Hall	North Bruce (aft.)	Jan.	6
2	Wiarton, Town Hall	North Bruce (evg.)	"	6
3	Lion's Head, Town Hall	North Bruce (aft.)	"	7
4	Spry, School	North Bruce (evg.)	"	7
5	Hopeness, No. 3, Eastmor Tp.	North Bruce (aft.)	"	8
6	Mar, School House	North Bruce (evg.)	"	8
7	Parkhead, Orange Hall	North Bruce	"	10
8	Gillies' Hill, Township Hall	Centre Bruce	"	11
9	Paisley, Town Hall	Centre Bruce	"	12
10	Walkerton, Town Hall	South Bruce	"	13
11	Teeswater, Town Hall	South Bruce	"	14
12	Clifford, Town Hall	Union	"	15
13	Lavery, School House	Union	"	17
14	Gorrie, Township Hall	East Huron	"	18
15	Brussels, Town Hall	East Huron	"	19
16	Blyth, Miline's Hall	West Huron	"	20
17	Londesboro	West Huron	"	21 & 22
18	Brookville, Hall	Halton	"	24
19	Esquesing, Village Hall	Halton	"	25

Division 2.

R. L. Moorehouse, Cairo, Jan. 6th to 27th.
J. B. Fairbairn, Beamsville, Jan. 6th to 8th.
Robt. Murphy, Alliston, Jan. 10th to 21st.
Dr. Mary McKenzie-Smith, Gravenhurst, Jan. 7th to 27th.

1	Brigden, McKenzie Hall	West Lambton (aft.)	Jan.	6
2	Moore's, Tp. Hall	West Lambton (evg.)	"	6
3	Wilkesport, Regan Hall	West Lambton (aft.)	"	7
4	Becher, Foresters' Hall	West Lambton (evg.)	"	7
5.	Oakdale	West Lambton	"	8
6	Kerwood	North Middlesex	"	10
7	Keyser	North Middlesex	"	11
8	Komoka, New Hall	North Middlesex	"	12
9	Coldstream, Town Hall	North Middlesex	"	13
10	Beechwood, Foresters' Hall	North Middlesex	"	14
11	Wilton Grove, Foresters' Hall	East Middlesex	"	15
12	Harrietsville, Oddfellows' Hall	East Middlesex	"	17
13	Birr, Town Hall	East Middlesex	"	18
14	Parkhill, Town Hall	North Middlesex	"	19
15	Brucefield, Walker's Hall	South Huron (aft.)	"	20
16	Varna	South Huron (evg.)	"	20
17	Exeter, Town Hall	South Huron	"	21
18	St. Mary's, Town Hall	South Perth	"	22
19	Thorndale, Harding's Hall	East Middlesex	"	24
20	Rostock, Queen's Hall	North Perth	"	25
21	Millbank, Ritter's Hall	North Perth	"	26
22	Shakespeare, Temp. Hall	North Perth	"	27

Division 3.

A. D. Harkness, Vineland Station, Jan. 6th to Feb. 2nd.
C. Schuyler, Brantford, Jan. 8th to 29th.
Mrs. H. W. Parsons, Cochrane, Jan. 6th to 8th; 13th to 26th.

1	Mount Elgin, Foresters' Hall	South Oxford	Jan.	6
2	Norwich, Town Hall	South Oxford	“	7
3	Courtland, Town Hall	North Norfolk	“	8
4	Delhi, Council Chambers	North Norfolk	“	10
5	Langton, Town Hall	South Norfolk	“	11
6	Vittoria, Lecture Room	South Norfolk	“	12
7	Villa Nova, Foresters' Hall	North Norfolk	“	13
8	Bealton, Hall	North Norfolk	“	14
9	Talbotville, Orange Hall	West Elgin	“	15
10	Aylmer, Town Hall	East Elgin	“	17 & 18
11	Wallacetown	West Elgin	“	19
12	Middlemiss, Village Hall	West Middlesex	“	20
13	Walker, School House	West Middlesex	“	21
14	Highgate, Town Hall	East Kent	“	22
15	Morpeth, A.O.U.W. Hall	East Kent	“	24
16	Guilds, School House	East Kent	“	25
17	Mull, School House	East Kent	“	26
18	Fletcher, Town Hall	West Kent	“	27
19	Valetta, Private Hall	West Kent	“	28
20	Wheatley	West Kent	“	29
21	Tecumseh	North Essex	“	31
22	Comber	North Essex	Feb.	1
23	South Woodslee, Pemberton's Hall	North Essex	“	2

Division 4.

C. A. Galbraith, Hornby, Jan. 5th to 27th.
A. F. Clark, Goderich, January 10th to 17th.
F. M. Clement, B.S.A., Vineland Station, Jan. 21st to 27th.
Mrs. F. W. Watts, Toronto, Jan. 5th to 7th; 18th to 25th.

1	Waterdown, Town Hall	North Wentworth	Jan.	5
2	Freelton, Baptist Church	North Wentworth	“	6
3	Rockton, Town Hall	North Wentworth	“	7
4	Falkland, Holbert's Hall	South Brant	“	10
5	Mt. Pleasant, Methodist Church	South Brant	“	11
6	Springvale, Oddfellows' Hall	Haldimand	“	12
7	Cheapside, Town Hall	Haldimand	“	13
8	Fisherville, Oddfellows' Hall	Haldimand	“	14
9	York, Town Hall	Haldimand	“	17
10	Marshville, Town Hall	Monck	“	18
11	Willoughby, Town Hall	Welland	“	19
12	Southend, School House	Welland	“	20
13	Campden, Hedden's Hall	Lincoln	“	21
14	Queenston, School House	Lincoln	“	24
15	Stoney Creek, Institute Hall	South Wentworth	“	25
16	Ancaster	South Wentworth	“	26
17	Mount Hope	South Wentworth	“	27

Division 5.

J. W. Clark, Cainsville, Jan. 5th to 25th.
L. E. Bowes, Strathnairn, Jan. 17th to 20th.
C. B. Smith, Smithdale, Jan. 21st and 22nd.
J. B. Fairbairn, Beamsville, Jan. 26th to 28th.
J. M. McCallum, Shakespeare, Jan. 26th to 28th.
Miss D. Sutherland, Embro, Jan. 5th to 25th.

1	New Lowell, Town Hall	West Simcoe	Jan.	5
2	Sunnidale Corners, Mill's Hall	West Simcoe	“	6
3	Stayner, Town Hall	West Simcoe	“	7
4	Batteau, School House	West Simcoe	“	8
5	Minesing, W. Hall	Centre Simcoe	“	10
6	Allenwood, Church Hall	Centre Simcoe	“	11
7	Thornton, Township Hall	South Simcoe	“	12
8	Bondhead, Orange Hall	South Simcoe	“	13
9	Grand Valley, Council Chamber	East Wellington	“	17
10	Arthur, Town Hall	East Wellington	“	18
11	Mount Forest, Allin's Hall	East Wellington	“	19
12	Conn, Orange Hall	East Wellington (aft.)	“	20
	Conn, School House	East Wellington (evg.)	“	20
13	Rothsay, Temp. Hall	West Wellington	“	21
14	Drayton, Town Hall	West Wellington	“	22
15	A. F. & G. Auld's (Aft. Short Course)	South Wellington (aft.)	“	24
16	S. S. No. 2, Guelph, T.	South Wellington (evg.)	“	24
17	Morriston (Aft. Short Course)	South Wellington (aft.)	“	25
18	Aberfoyle	South Wellington (evg.)	“	25
19	Tranquility, School House	North Brant	“	26
20	Cainsville, Orange Hall	North Brant	“	27
21	Onondaga, Town Hall	North Brant	“	28

Division 7.

Gavin Barbour, Crosshill, Dec. 1st to 3rd; 13th to 17th.
P. C. Dempsey, Trenton, Dec. 15th to 17th.
Mrs. H. W. Parsons, Cochrane, Dec. 1st to 3rd; 13th and 16th.

1	Claremont, Mason's Hall	South Ontario	Dec.	1
2	Whitevale, Oddfellows' Hall	South Ontario	“	2
3	Greenbank, Temperance Hall	South Ontario	“	3
4	Goodwood, Township Hall	North Ontario	“	13
5	Altona, School House	North Ontario	“	14
6	Nestleton, Foresters' Hall	West Durham	“	15
7	Solina	West Durham (aft.)	“	16
8	Tyrone	West Durham (evg.)	“	16
9	Ebenezer, S. S. Room	West Durham	“	17

Division. 8.

Henry Grose, Lefroy, Nov. 30th. to Dec. 18th.
P. C. Dempsey, Trenton, Dec. 13th and 14th.
Mrs. F. W. Watts, Toronto, Nov. 30th to Dec. 3rd, 9th and 10th; 15th to 18th.

1	Bobcaygeon, Town Hall	East Victoria	Nov.	30
2	Fenelon Falls, Dicken's Hall	East Victoria	Dec.	1
3	Oakwood, Township Hall	West Victoria	“	2
4	Valentia, Foresters' Hall	West Victoria	“	3
5	Grafton	West Northumberland	“	9
6	Harwood, Boyles Hall	West Northumberland	“	10
7	Manvers	East Durham (aft.)	“	13
8	Pontypool	East Durham (evg.)	“	13
9	Fairmount	East Durham (aft.)	“	14
10	Mount Pleasant	East Durham (evg.)	“	14
11	Stewart's Hall	West Peterboro	“	15
12	Lakefield, Town Hall	West Peterboro	“	16
13	Warsaw, Town Hall	East Peterboro	“	17
14	Norwood, Town Hall	East Peterboro	“	18

DIVISION 9.

W. C. Shearer, Bright, Nov. 30th to Dec. 3rd; 8th to 14th.
J. W. Clark, Cainsville, Dec. 16th and 17th.
H. Sirett, Brighton, Dec. 16th and 17th.
Miss M. V. Powell, Whitby, Dec. 3rd; 8th to 11th.
Miss G. Gray, Toronto, Dec. 14th, 16th, 17th.

1	Odessa, Town Hall	Lennox	Nov.	30
2	Napanee, Town Hall	Lennox	Dec.	1
3	Newburgh, Standard Bank Hall	Addington	“	2
4	Enterprise, Keech's Hall	Addington	“	3
5	Thomasburg, I.O.O.F. Hall	East Hastings	“	8
6	Plainfield, Orange Hall	East Hastings	“	9
7	Spencer's School House	East Hastings	“	10
8	Melrose, Town Hall	East Hastings	“	11
9	Wallbridge, Town Hall	West Hastings	“	13
10	Hogles, School House	West Hastings	“	14
11	Bloomfield, Town Hall	Prince Edward	“	16
12	Rednersville	Prince Edward	“	17

DIVISION 10.

F. M. Johnston, Brantford, Nov. 30th to Dec. 16th.
Mrs. R. L. Moorehouse, Cairo, Nov. 30th to Dec. 16th.

1	Hartington	Frontenac	Nov.	30
2	Wolfe Island	Frontenac	Dec.	1
3	Delta, Town Hall	South Leeds	“	2
4	Lansdowne, Town Hall	South Leeds	“	3
5	Spencerville, Town Hall	South Grenville	“	6
6	Maynard, Methodist Church	South Grenville	“	7
7	Morewood, Town Hall	Dundas	“	8
8	Inkerman, A.O.U.W.	Dundas	“	9
9	Perth	South Lanark	“	10
10	Maberley, Town Hall	South Lanark	“	11
11	MacDonald's Corners, Agricultural Hall	North Lanark	“	13
12	Elphin, Public Hall	North Lanark	“	14
13	Mountain Grove, Town Hall	Centre Frontenac	“	15
14	Parham, I.O.O.F. Hall	Centre Frontenac	“	16

DIVISION 11.

A. R. G. Smith, New Hamburg, Dec. 1st to 16th.
A. D. Harkness, Vineland St., Dec. 1st to 3rd; 7th and 8th.
Miss S. Campbell, Toronto, Dec. 1st to 16th.

1	McCrimmon, Public Hall	Glengarry	Dec.	1
2	Maxville, Women's Institute	Glengarry	“	2
3	Moose Creek	Stormont	“	3
4	Martintown, St. Andrew's Hall	Glengarry	“	6
5	Avonmore, Oddfellows Hall	Stormont	“	7
6	Berwick, Township Hall	Stormont	“	8
7	Vernon	Russell	“	9
8	Metcalfe	Russell	“	10
9	Kars, Public Hall	Carleton	“	13
10	North Gower, Town Hall	Carleton	“	14
11	Glasgow Station	South Renfrew	“	15
12	Northcote, Temperance Hall	South Renfrew	“	16

SUPPLEMENTARY MEETINGS.

DIVISION 1.

Wm. C. Barrie, R.R. 7, Galt, Jan. 6th to 26th.
Miss M. V. Powell, Whitby, Jan. 6th to 26th.

1	Fordwich, Brown's Hall	East Huron	Jan.	6
2	Molesworth, Orange Hall	East Huron	"	7
3	Jamestown, Victoria Hall	East Huron	"	8
4	Bluevale, Foresters' Hall	East Huron	"	10
5	Ethel, Township Hall	East Huron	"	11
6	Moncrieff, School House	East Huron	"	12
7	Walton, A.O.U.W. Hall	East Huron	"	13
8	Winthrop, Calder's Hall	East Huron	"	14
9	Harlock, School House	East Huron	"	15
10	Belgrave, Foresters' Hall	East Huron	"	17
11	Kincardine, Town Hall	Centre Bruce	"	18
12	Bervie, I.O.O.F. Hall	Centre Bruce	"	19
13	Reed's Corners, Woodman's Hall	Centre Bruce	"	20
14	Ripley, Township Hall	Centre Bruce	"	21
15	Kintail, McDonald's Hall	West Huron	"	22
16	St. Helen's, Mech. Inst. Hall	West Huron	"	24
17	Holmesville, Holmes' Hall	West Huron	"	25
18	Auburn, Foresters' Hall	West Huron	"	26

DIVISION 2.

G. Barbour, Crosshill, Jan. 5th to Feb. 5th.
Mrs. W. J. Hunter, R.R. 2, Brampton, Jan. 5th to 27th.

1	Tara	West Bruce	Jan.	5
2	Port Elgin	West Bruce	"	6
3	Tiverton	West Bruce	"	7
4	Underwood	West Bruce	"	8
5	Burgoyne	West Bruce	"	10
6	Allenford	West Bruce	"	11
7	Walter's Falls, A.O.U.W. Hall	Centre Grey	"	12
8	Rocklyn, Agric. Hall	Centre Grey	"	13
9	Heathcote, Public Hall	Centre Grey	"	14
10	Ravenna, Township Hall	Centre Grey	"	15
11	Kimberley, Union Hall	Centre Grey	"	17
12	Priceville, Watson's Hall	Centre Grey	"	18
13	Hopeville, Public Hall	Centre Grey	"	19
14	Maxwell, Orange Hall	Centre Grey	"	20
15	Singhampton, Hamilton's Hall	West Simcoe	"	21
16	Duntroon, S.O.S. Hall	West Simcoe	"	22
17	Dunedin, Jackson's Hall	West Simcoe	"	24
18	Creemore, Leonard's Hall	West Simcoe	"	25
19	Everett, Orange Hall	West Simcoe	"	26
20	Alliston, Town Hall	West Simcoe	"	27
21	Meaford	North Grey (aft.)	"	28
22	Annan Hall	North Grey (aft.)	"	31
23	Owen Sound	North Grey (aft.)	Feb.	1
24	Kemble, School	North Grey (aft.)	"	2
25	Shallow Lake, Hall	North Grey (aft.)	"	3
26	Kilsyth, Township Hall	North Grey (aft.)	"	4
27	Chatsworth	North Grey (aft.)	"	5

Division 4.

Geo. Gier, Waldemar, Nov. 30th to Dec. 17th.
Mrs. W. J. Hunter, Brampton, Nov. 30th to Dec. 17th.

1	Hanover, Town Hall	South Grey (aft.)	Nov. 30
2	Ayton, Doersam's Hall	South Grey (evg.)	“ 30
3	Dromore, Russel Hall	South Grey (aft.)	Dec. 1
4	Holstein, Agri. Hall	South Grey (evg.)	“ 1
5	Durham, Town Hall	South Grey (aft.)	“ 2
6	Varney	South Grey (evg.)	“ 2
7	Dornoch, Smith's Hall	South Grey (aft.)	“ 3
8	Glenelg, Township Hall	South Grey (evg.)	“ 3
9	Holyrood, Township Hall	South Bruce	“ 14
10	Lucknow, Town Hall	South Bruce	“ 15
11	Belmore, Foresters' Hall	South Bruce	“ 16
12	Mildmay, Township Hall	South Bruce	“ 17

Division 5.

Henry Grose, Lefroy, Feb. 8th to 26th.
C. A. Galbraith, Hornby, Feb. 17th to 22nd.
Mrs. F. W. Watts, Toronto, Feb. 8th to 11th; 21st to 26th.

1	Florence, Town Hall	East Lambton	Feb. 8
2	Alvinston, Town Hall	East Lambton	“ 9
3	Powell's School	East Lambton	“ 10
4	Sutorville, Hall	East Lambton	“ 11
5	Oil Springs, Town Hall	West Lambton (aft.)	“ 12
6	Petrolia, Town Hall	West Lambton (evg.)	“ 12
7	Sarnia, Town Hall	West Lambton (aft.)	“ 14
8	Lucasville, School	West Lambton (evg.)	“ 14
9	Wyoming, Town Hall	East Lambton	“ 15
10	Thedford, King Ed. Hall	East Lambton	“ 16
11	Greenway, Wilson's Hall	North Middlesex	“ 17
12	Mount Carmel	North Middlesex	“ 18
13	West McGillivray, Town Hall	North Middlesex	“ 19
14	Granton, Town Hall	North Middlesex	“ 21
15	Clandeboye, Hennesey's Hall	North Middlesex	“ 22
16	Appin	West Middlesex	“ 23
17	Glencoe	West Middlesex	“ 24
18	Newbury	West Middlesex	“ 25
19	Wardsville	West Middlesex	“ 26

Division 6.

H. C. Nixon, St. George, Feb. 8th to 24th.
Gavin Barbour, Crosshill, Feb. 8th to 11th; 15th to 24th.
Miss B. Gilholm, Bright, Feb. 10th to 19th.

1	Clifford, Town Hall	Union	Feb. 8
2	Lakelet, Derroch Hall	Union	“ 9
3	Drew, Temperance Hall	Union	“ 10
4	Teviotdale, Foresters' Hall	Union	“ 11
5	Gowanstown, Orange Hall	North Perth (aft.)	“ 12
6	Milverton, Cook's Hall	North Perth (evg.)	“ 12
7	Kinkora, C.M.B.A. Hall	North Perth (aft.)	“ 14
8	Monkton, Erskine's Hall	North Perth (evg.)	“ 14
9	Sebringville, Foresters' Hall	South Perth	“ 15
10	Brodhagen, Township Hall	South Perth	“ 16
11	Fullarton, Township Hall	South Perth	“ 17
12	Staffa, Township Hall	South Perth	“ 18
13	Kirkton, Aberdeen Hall	South Perth	“ 19
14	Farquhar, I.O.F. Hall	South Huron (aft.)	“ 21
15	Elimville, T. P. Hall	South Huron (evg.)	“ 21
16	Zurich, Town Hall	South Huron (aft.)	“ 22
17	Hensall, Town Hall	South Huron (evg.)	“ 22
18	Dashwood, Zimmer's Hall	South Huron (aft.)	“ 23
19	Grand Bend, Brenner's Hall	South Huron (evg.)	“ 23
20	Crediton, Town Hall	South Huron	“ 24

Division 8.

F. M. Johnston, Brantford, Feb. 2nd to 5th; 12th to 26th.
A. W. Ross, Blenheim, Feb. 2nd and 3rd.
Miss Susie Campbell, Toronto, Feb. 4th and 5th; 12th to 17th; 22nd to 26th.

1	Mount Salem	East Elgin	Feb.	2
2	Sparta, Town Hall	East Elgin	"	3
3	Shedden, Morrison's Hall	West Elgin	"	4
4	West Lorne, Town Hall	West Elgin	"	5
5	Leamington, Town Hall	South Essex	"	12
6	Kingsville, Town Hall	South Essex	"	14
7	Cottam, Town Hall	South Essex	"	15
8	Harrow, Town Hall	South Essex	"	16
9	Malden, Town Hall	South Essex	"	17
10	Oldcastle	North Essex	"	18
11	Belle River, Town Hall	North Essex	"	19
12	St. Joachim, Town Hall	North Essex	"	21
13	Kent Centre, K. C. Hall	East Kent	"	22
14	Wabash, Foresters' Hall	East Kent	"	23
15	Croton, Young's Hall	East Kent	"	24
16	Thamesville, Town Hall	East Kent	"	25
17	Botany, Presbybterian Church	East Kent	"	26

Division 9.

R. L. Moorehouse, Cairo, Feb. 9th to March 1st.
Mrs. R. L. Moorehouse, Cairo, Feb. 9th, 15th to 28th.

1	Glen Morris, Forester Hall	North Brant	Feb.	9
2	Moyle's School	North Brant	"	10
3	Howell's School	North Brant	"	11
4	Bethel, Methodist Church	South Brant	"	12
5	McNaught's School	South Brant (aft.)	"	14
6	Mount Vernon, School	South Brant (evg.)	"	14
7	Ohsweken, Council Chamber	South Brant	"	15
8	Burtch, School House	South Brant	"	16
9	Oakland, Foresters' Hall	South Brant	"	17
10	Kelvin, Hall	North Norfolk	"	18
11	Windham Centre, Town Hall	North Norfolk	"	19
12	Tyrell, Hall	North Norfolk	"	21
13	Walsh, Town Hall	South Norfolk	"	22
14	St. Williams	South Norfolk	"	23
15	Fairgrounds, Town Hall	South Norfolk	"	24
16	Guysboro, Orange Hall	North Norfolk	"	25
17	Springford	South Oxford	"	26
18	Burgessville, Oddfellows' Hall	South Oxford	"	28
19	Beachville, Town Hall	South Oxford	"	29
20	Folden's Hall	South Oxford	Mar.	1

Division 10.

J. W. Clark, Cainsville, Feb. 2nd to March 1st.
Dr. Mary McKenzie-Smith, Gravenhurst, Feb. 2nd to March 1st.

1	Millgrove, Town Hall	North Wentworth	Feb.	2
2	Westover, Oddfellows' Hall	North Wentworth	"	3
3	Kirkwall, School	North Wentworth	"	4
4	Sheffield, Town Hall	North Wentworth	"	5
5	Jerseyville, Lee's Hall	South Wentworth	"	7
6	Carluke, School House	South Wentworth	"	8
7	Mount Hope, Town Hall	South Wentworth	"	9
8	Elfrida, Liddy's Hall	South Wentworth	"	10
9	Binbrook, Public Hall	South Wentworth	"	11
10	Winona, Inst. Hall	South Wentworth	"	14
11	Beamsville, Town Hall	Lincoln	"	15
12	Jordan Station, Frank's Hall	Lincoln	"	16

13	Grantham, Orange Hall	Lincoln	“	17
14	Virgil, Public Hall	Lincoln	“	18
15	Humberstone, Town Hall	Welland	“	19
16	Sherks School	Welland (aft.)	“	21
17	Bowen Road, School	Welland (evg.)	“	21
18	Ridgeway, Town Hall	Welland	“	22
19	Stevensville, School	Welland	“	23
20	Brookfield, School	Welland	“	24
21	Crowland, Town Hall	Welland	“	25
22	Fonthill, Hall	Welland	“	26
23	Pelham Centre, Town Hall	Monck	“	28
24	Silverdale, School	Monck	“	29
25	Smithville, Brant's Hall	Monck	Mar.	1

DIVISION 12.

A. R. G. Smith, New Hamburg, Feb. 2nd to 29th.
Mrs. H. W. Parsons, Cochrane, Feb. 2nd to 29th.

1	Agincourt	East York	Feb.	2
2	Victoria Square	East York	“	3
3	Stouffville	East York	“	4
4	Pine Orchard, Temperance Hall	North York	“	7
5	Keswick	North York	“	8
6	King	North York	“	9
7	Schomberg	North York	“	10
8	Bolton	Peel	“	11
9	Sandhill	Peel	“	12
10	Caledon	Peel	“	14
11	Belfountain	Peel	“	15
12	Cheltenham	Peel	“	16
13	Huttonville	Peel	“	17
14	Meadowvale	Peel	“	18
15	Ebenezer	Peel	“	19
16	Cooksville	Peel	“	21
17	Erin, Town Hall	Centre Wellington	“	22
18	Orton, Town Hall	Centre Wellington	“	23
19	Belwood, Town Hall	Centre Wellington	“	24
20	Bethany, Methodist Church	Centre Wellington	“	25
21	Cumnock, School House	Centre Wellington	“	26
22	Moorefield, Township Hall	West Wellington	“	28
23	Palmerston, Anderson Hall	West Wellington	“	29

DIVISION 13.

F. M. Johnston, Brantford, Jan. 6th to 29th.
Dr. S. L. Fotheringham, Toronto, Jan. 6th to 29th.

1	Honeywood, Workman's Hall	Dufferin	Jan.	6
2	Horning's Mills, Orange Hall	Dufferin	“	7
3	Perm, Orange Hall	Dufferin	“	8
4	Violet Hill, Orange Hall	Dufferin	“	10
5	Laurel, Orange Hall	Dufferin	“	11
6	Bowling Green, Orange Hall	Dufferin	“	12
7	Blount, School House	Dufferin	“	13
8	Kleinburg, Temperance Hall	West York	“	16
9	Richview, Methodist Church	West York	“	17
10	Elia, Foresters' Hall	West York	“	18
11	Maple, Masonic Hall	West York	“	19
12	Thornhill	East York	“	20
13	Wexford	East York	“	21
14	Unionville	East York	“	24
15	West Hill	East York	“	25
16	McCurdy's Corners, School	Halton	“	26
17	Trafalgar, Hall	Halton	“	27
18	Nelson, Township Hall	Halton	“	28

Division 14.

W. J. Kerr, Woodroffe, Jan. 5th to 21st.
H. C. Nixon, St. George, Jan. 5th to 21st.
Mr. Kerr will address afternoon sessions of the Women's Institutes.

1	Zephyr, Public Hall	North Ontario	Jan.	5
2	Sandford, Hall	North Ontario	"	6
3	Sunderland, Town Hall	North Ontario	"	7
4	Brechin, School House	North Ontario	"	8
5	Woodville, Village Hall	West Victoria	"	10
6	Lindsay, Town Hall	East Victoria	"	11
7	Cameron, Orange Hall	East Victoria	"	12
8	Dunsford, Old Church	East Victoria	"	13
9	Omemee	East Victoria	"	14
10	Bethany, Town Hall	East Durham (aft.)	"	15
11	Franklin	East Durham (evg.)	"	15
12	Cavanville, Old Church	East Durham (aft.)	"	17
13	Bailieboro, S. of E. Hall	East Durham (evg.)	"	17
14	Elizabethville, Orange Hall	East Durham (aft.)	"	18
15	Campbellcroft, Inst. Hall	East Durham (evg.)	"	18
16	Canton	East Durham (aft.)	"	19
17	Moorish, S. S. Hall	East Durham (evg.)	"	19
18	Newtonville, S. of Temp. Hall	West Durham (aft.)	"	20
19	Orono, Town Hall	West Durham (evg.)	"	20
20	Bowmanville	West Durham	"	21

Division 15.

J. H. Ferguson, Osgoode Station, Jan. 7th to 21st.
A. E. Wesbrook, Oakland, Jan. 10th to Feb. 3rd.
W. J. Kerr, Woodroffe, Jan. 22nd to Feb. 3rd.
A. J. Fallis, Millbrook, Feb. 4th to 10th.
Miss Susie Campbell, Toronto, Jan. 15th to 31st.
Dr. Susan L. Fotheringham, Toronto, Feb. 4th to 7th, 10th.

1	Havelock, Town Hall	East Peterboro	Jan.	7
2	Douro, Old Church	East Peterboro (aft.)	"	8
3	Fourth Line, Smith	West Peterboro	"	10
4	Buckhorn	West Peterboro	"	11
5	Keene, Town Hall	East Peterboro	"	12
6	Menie, Town Hall	East Northumberland	"	13
7	Gilbert's School	West Hastings	"	14
8	River Valley, School House	West Hastings	"	15
9	Turner's School House	West Hastings	"	17
10	Foxboro, Public Hall	East Hastings	"	18
11	Phillipston, I.O.F. Hall	East Hastings	"	19
12	Roslin, C.O.C.F. Hall	East Hastings	"	20
13	Wooler, Town Hall	East Northumberland	"	21
14	Codrington	East Northumberland	"	22
15	Castleton, Town Hall	East Northumberland	"	24
16	Centreton, Meth. S. S. Hall	West Northumberland	"	25
17	Baltimore, Chapman's Hall	West Northumberland	"	26
18	Cold Springs, Township Hall	West Northumberland	"	27
19	Roseneath, Township Hall	West Northumberland	"	28
20	Cherry Valley, Town Hall	Prince Edward	"	29
21	Milford, Town Hall	Prince Edward	"	31
22	Waupoos, Foresters' Hall	Prince Edward	Feb.	1
23	Doxsees, School House	Prince Edward	"	2
24	Hillier, Town Hall	Prince Edward	"	3
25	Whitby	South Ontario	"	4
26	Brooklin, Masonic Hall	South Ontario	"	5
27	Columbus	South Ontario	"	7
28	Kinsale	South Ontario	"	8
29	Brougham, Town Hall	South Ontario	"	9
30	Pickering	South Ontario	"	10

DIVISION 16.

J. N. Paget, Canboro, Jan. 6th to 27th.
P. O. Vansickle, Trinity, Jan. 12th to 27th.
Miss Susie Campbell, Toronto, Jan. 6th to 13th.

1	Sine, For. Club Rooms	North Hastings	Jan.	6
2	Springbrook, Foresters' Hall	North Hastings	"	7
3	Marmora, Town Hall	North Hastings	"	8
4	Eldorado, Town Hall	North Hastings	"	10
5	Madoc, Town Hall	North Hastings	"	11
6	Ivanhoe, Orange Hall	North Hastings	"	12
7	Moira, Town Hall	North Hastings	"	13
8	Adolphustown, Town Hall	Lennox	"	14
9	Sillsville, Town Hall	Lennox	"	15
10	Bath, Town Hall	Lennox	"	17
11	Westbrooke	Frontenac	"	18
12	Dufferin	Frontenac	"	19
13	Inverary	Frontenac	"	20
14	Sydenham	Frontenac	"	21
15	Wilton, Orange Hall	Lennox	"	22
16	Centreville, Town Hall	Addington	"	24
17	Tamworth, Town Hall	Addington	"	25
18	Lyn	South Leeds	"	26
19	Westport	South Leeds	"	27

DIVISION 17.

W. C. Shearer, Bright, Jan. 7th to 17th.
H. Sirett, R.R. 4, Brighton, Jan. 7th to 17th.
Mrs. W. F. Stephen, Huntingdon, Que., Jan. 7th to 14th.

1	Brouseville, School	South Grenville	Jan.	7
2	Shanly, Workman's Hall	South Grenville	"	8
3	Brinston, Gibson's Hall	Dundas	"	10
4	Winchester, Springs, Orange Hall	Dundas	"	11
5	Cornwall Centre, Township Hall	Stormont	"	12
6	Osnabruck Centre, Town Hall	Stormont	"	13
7	Williamstown, St. Andrew's Hall	Glengarry	"	14
8	Greenfield	Glengarry	"	15
9	North Lancaster, McDonald's Hall	Glengarry	"	17

DIVISION 17*a*.

French instructors will attend these two meetings.

1	St. Ann de Prescott, Leafromborsis Hall	Prescott	Jan.	11
2	Chute au Blondeau, School	Prescott	"	12

DIVISION 18.

Henry Grose, Lefroy, Jan. 6th to 13th; 24th to 28th.
J. F. Ferguson, Osgoode Station, Jan. 24th to 28th.
Miss G. Gilholm, Bright, Jan. 6th, 7th, 11th; 24th to 28th.

1	Manotick, Harmony Hall	Carleton	Jan.	6
2	Stittsville	Carleton	"	7
3	Goshen, Temperance Hall	South Renfrew	"	10
4	Burnstown, Temperance Hall	South Renfrew	"	11
5	Galbraith, School	South Renfrew	"	12
6	Grattan, School	South Renfrew	"	13
7	Queen's Line, School House	North Renfrew	"	24
8	Beachburg, Public Hall	North Renfrew	"	25
9	Westmeath, Public Hall	North Renfrew	"	26
10	Poland, Private Hall	North Lanark	"	27
11	Watson's Corners, Temperance Hall	North Lanark	"	28

SPEAKERS AND SUBJECTS.

Barbour, Gavin, Crosshill.—Mr. Barbour is representative of a large number of farmers who have succeeded, by hard labour and a thorough knowledge of the lines of farming followed, in increasing the productivity of the farm and making many improvements, while paying off obligations.

Mr. Barbour has been an acceptable Institute worker for several years. He is particularly well qualified to give practical demonstrations in the judging of beef cattle. The young farmers especially should benefit from Mr. Barbour's addresses and demonstrations.

Subjects:—

"Soil Cultivation and Control of Soil Moisture."
"Beef Cattle."
"Draught Horses and How to Raise Them."
"Corn and the Silo."
"How to Grow Crops in a Dry Season."

Evening:
"Farmers and Their Sons."
"Present Day Needs of Ontario Agriculture."

Bowes, L. E., Strathnairn.—Mr. Bowes has been active in the agriculture of his own district, taking a prominent part in the local Farmer's Club and Literary Society. He is a breeder of Clydesdale horses and Shorthorn cattle. The feeding of beef cattle is one of the leading features in his farming operations. Corn and alfalfa are grown in large quantities on his farm.

Subjects:—
"Raising Draught Horses."
"Breeding and Feeding of Beef Cattle."
"Alfalfa and Corn."
'Cultivation and rotation of Crops."
Evening:
"Canadian Citizenship."
"Some of the Mysteries of Nature."

Clark, A. F., V.S., Goderich.—Dr. Clark is a veterinarian who has taken an interest and active part in Institute work for a number of years. He has been engaged as one of the inspectors in connection with Stallion Enrolment in Ontario. He will be prepared to give addresses on ailments of farm animals, their feeding and general care.

Clark, J. W., Cainsville.—Mr. Clark is one of the largest poultry breeders in Ontario, and has won many prizes for dressed poultry at the Winter Fair, Guelph, including the sweepstakes. He is a strong advocate of utility breeds for the farmer. For two years Mr. Clark was poultry instructor in an American State Agricultural College. He has had several years' experience in growing alfalfa, and has also a large apiary. Mr. Clark has given considerable attention to the production of good seed and methods of identification and eradication of weeds. After eight years' work on an apple orchard of five acres, he increased the yield from 100 barrels of inferior fruit to 878 barrels of a choice product. In 1913 his apiary netted a three-and-a-half ton yield. Mr. Clark will explain his methods to the Institutes, and will illustrate his evening addresses by the use of a lantern.

Subjects:—
"Growing Alfalfa."
"Commercial Apple Growing—How to Make it Pay."
"Making a Small Farm Pay."
"Importance of Seed Selection."
"Commercial Fertilizers—Do They Pay?"

Evening:
"Poultry: From A to Z."
"Care of an Apiary."

Dempsey, P. C., Trenton.—Mr. Dempsey is a graduate of the Ontario Agricultural College, with a wide experience in fruit-growing on one of the best fruit-growing farms in the Trenton District. He has had experience in District Representative work and in regular Institute work.

Subjects:—
"Up-to-date Orcharding."
"Fertilizers and Soil Treatment."
"The Potato Business."
"Water for the big Crop."
"Selection and profit for the Farmer."
"Farm Losses."
"Getting the Work Done."

Evening:
"What Then?"

Downey, Geo., R.R. 2, Bolton.—Mr. Downey has taken a keen interest in agricultural advancement in his own county for a number of years, having been an officer in the Institute and given addresses on agricultural topics at a number of public gatherings.

Subjects:—
"Some Figures on Growing Beef and Pork."
"Sheep—Their Care and Place on the Farm."
"Potatoes."
"Field Crop Competition and Control of Weeds."
Evening:
"Is It Worth While?"
"Our Young People and Literary Societies."

Duke, J. O., Ruthven.—Mr. Duke is a successful farmer in Essex County, and has given special attention to corn breeding and seed selection. His addresses, being founded on practical experience, are of much value to those who hear them.

Subjects:—
"Maintaining the Fertility of the Soil."
"Corn Growing."
"Improvement of Seed."
"The Peach Industry."
"Apple Culture in Western Ontario."
"Tile Drainage."
Evening:
"Education for Farmers' Boys and Girls."
"Home Life on the Farm."
"Business End of Farming."

Fallis, A. J., Millbrook.—Mr. Fallis has for a number of years been a leader in the Agricultural Organizations of his district. His experience as secretary of the Institute and his success as a practical farmer will insure valuable services as a regular Institute worker.

Subjects:—
"Potato Growing for Commercial Purposes."
"Seed Selection and Soil Cultivation—Their Influence on Crop Production."
"Root Culture."
"Cattle, Sheep and Swine—Selection, Breeding, Feed and Care."
"The Beef Animal from Birth to Maturity."

Fairbairn, J. B., Beamsville.—As proprietor of the Summerhill Fruit Farm, Mr. Fairbairn has had a very successful experience in fruit growing. He was associated with College work at the Ontario Agricultural College for a number of years and has acted as fruit inspector in his district this year. Mr. Fairbairn is prepared to give valuable advice on controlling fruit diseases and on general orchard work."

Subjects:—
"Peach Diseases."
"Identification and Treatment of San Jose Scale."
"Insects Found in Apple Orchards and Methods of Their Control."
"Spraying Materials and Spraying."
"The Way in which Co-operation may assist in the Distribution and Selling of Farm Products."

Ferguson, Jas. F., Osgoode Station.—Since his two years' course at the Ontario Agricultural College, Guelph, Mr. Ferguson has followed mixed farming in Carleton County, devoting special attention to the improvement of his dairy herd by systematic testing. He is a member of the Canadian Seed Growers' Association.

Subjects:—

"The Benefits of Cow Testing."
"Essentials in the Care of Live Stock."
"Economical Feeding of Live Stock."
"Crop Rotation."
"Bacon Production."

Galbraith, Chas. A., Hornby.—Mr. Galbraith is a College graduate with subsequent experience as a District Representative and practical farmer. During his College course he took a deep interest in underdrainage and cultivation, as well as in live stock.

Subjcts:—

"Underdrainage, its Relation to Tilth and Crop Production."
"Soil Fertility, its Nature and Maintenance."
"The Culture of Alfalfa and Sweet Clover."
"Feeds and Feeding—A Practical Application of Chemical Analysis."
"Breeds and Breeding of Farm Animals."
"Insects and Fungus Diseases Affecting Farm Crops."
"Weeds of the Farm and Practical Methods of Control."
"Bacteria and Their Relation to Food, Soil and Disease."

Evening:

"The Basic Industry of an Empire."
"In the Service of King and Country."

Gardhouse, John, Weston.—Mr. Gardhouse is a well-known breeder of Shire Horses, Shorthorn Cattle and Long-wool Sheep. All of the prize lists of our large fairs testify to his ability to raise high-class stock. He raises most of the food for his purebred stock, and is prepared to tell how he cultivates his land, plants his crop, and mixes his foods so as to secure the best results from his live stock. Mr. Gardhouse will be found of special value to those Institutes where the officers wish for instruction in breeding and care of heavy horses, beef cattle, and sheep.

Subjects:—

"Horse Breeding for Profit."
"Care and Management of Horses."
"How to Select and Feed Beef Cattle."
"Care and Management of Sheep."
"Raising Feed for Live Stock."

Evening:
"How to Improve Present Farm Conditions."
"How to Interest the Young People in the Farm."

Gardhouse, Wm. J., Thistletown, Ont.—Mr. Gardhouse is the son of John Gardhouse, so well and favorably known to live stockmen throughout the Dominion, and, although a young man, has already had considerable experience in the judging of live stock at fall fairs. He is a most successful farmer and an excellent judge of heavy horses and beef cattle. He will devote more or less time during the coming winter to Short Course work as well as regular Institute work.

Subjects:—

"Conformation and Judging of Heavy Horses, Beef Cattle and Sheep."
"Cheap Foods for Farm Stock."
"Type in Live Stock."

Gier, George, Waldemar.—Mr. Gier is one of the most successful breeders of Shorthorns in Ontario, having produced many winners at Toronto and other leading shows. Mr. Gier possesses and operates one of the most productive farms in Dufferin County. He is well qualified to give practical and instructive lectures on:

Subjects:—

"The Breeding of Shorthorns."
"The Economic Production of Beef."
"Tile Drainage."

Grose, Henry. Lefroy.—Mr. Grose is the owner of a first-class farm in Simcoe County, and has been eminently successful in general farming. He has the happy faculty of presenting hard facts in a pleasing manner. and his address to boys on the farm is very instructive and uplifting. Mr. Grose has attended Institute meetings for a number of years with acceptance, and his services should be of special value in those sections where mixed farming is followed.

Subjects:—

"How to Increase and Maintain the Fertility of the Soil."
"Selection of Seed."
"Home Dairy Work."
"The Growing of Clover."

Evening:
"Benefits of Institute Work."
"The Canadian Boy and Girl."

Hankinson, L. D., Aylmer, Ont.—Mr. Hankinson has made valuable application of his course at Guelph in the practical operations of his farm. He has specialized in the growing of corn for seed, and will have much information of value along this line, as well as general farm topics.

Subjects:—

"The Production of Corn for Fodder and Seed."
"Keeping up the Fertility of the Farm."
"Alfalfa Growing."
"Modern Improvements on the Farm and in the Home."

Harkness, A. D., Vineland Station.—Mr. Harkness was for many years a prominent dairyman and fruit grower in the eastern section of Ontario.

Subjects:—

"Preparation for Planting and Care of the New Orchard."
"Cover Crops."
"Insects and Fungi Injurious to Fruit and Means of Controlling Them."
"Growing Small Fruits and Early Tomatoes."
"Potato Production."
"The Farmer's Garden."
"The Dairy Cow."
"Growing of Crops for the Dairy Herd."

Harkness, R. E., Irena.—Mr. Harkness has specialized in Fruit-Growing and Bee-Keeping; two branches which can be made most profitable in practically all sections of the Province. Mr. Harkness has had some experience in local Institute work and there is no doubt but that his services will be appreciated in the larger field.

Subjects:—

"Orchard-planting, Pruning, Cultivating."
"Orchard-spraying, Thinning, Packing, Marketing."
"Bee-Keeping."
"The Farmer's Garden."
"Eradication of Farm Weeds."

Johnston, F. M., 34 Murray Street, Brantford.—Mr. Johnston is a well educated young farmer who has been successful in the production of pure bred Holstein cattle. The growing of alfalfa and corn has been emphasized on his up-to-date farm. Mr. Johnston has been a leader in Farmers' Club work and we have every confidence that his services will be much appreciated at the Institute meetings.

Subjects:—

"The Dairy Herd."
"Corn and the Silo."
"Alfalfa."
"Swine—the Breeding and Feeding."

Evening:
"Poultry" (Illustrated).
"A Few Things Worth Reviewing."

Kerr, W. J., Woodroffe, Ont.—Mr. Kerr is a successful small fruit farmer, with considerable experience in the growing of ornamental and decorative trees. He has been very prominently connected with the vegetable industry of the Province for many years and is quite competent to speak on most phases of this important industry. He has also been an officer of the Ottawa and Westboro Horticultural Societies for several years, and has had much experience in laying out and planting lawns and gardens about private homes and public institutions, and is prepared to give many valuable hints in this connection.

Subjects:—

"How to Make the Farm Orchard Pay."
"Commercial Fruit Growing."
"Truck Gardening for City Market."
"The Kitchen Garden, Varieties and Methods."
"Our Insect Friends and Foes."

Evening:
"Beautifying the Home Grounds."
"Interesting the Young Folk in the Farm and Home."

Mallory, **Fred.** R., B.S.A., Frankford.—Since graduating from the O.A.C., Guelph, Mr. Mallory has devoted his attention to practical work on the farm. He keeps a number of pure-bred Holstein cattle and produces milk in large quantities. The success attending the application of scientific principles to the practical work of the farm has been demonstrated by Mr. Mallory, and he has much of interest and value for the tiller of the soil. Mr. Mallory can attend only a limited number of meetings this year.

Subjects:—

"Dairy Farming."
"Silos and Silage."
"Clover."
"The Question of Plowing Deep or Shallow."
"The Farmer's Garden."
"Farm Surroundings."

Evening:
"Can Farm Labor be Systematized?"
"Are We Our Neighbors' Keeper"
"Agriculture in Wartime."

McCallum, J. M., B.S.A., Shakespeare.—Mr. McCallum is a graduate of the O.A.C. and has since his graduation been putting into practice, with good effect, the lessons learned during his course. Mr. McCallum has been a most acceptable judge at the Fall Fairs, and has had experience in Institute work. He is a forceful and convincing speaker.

Subjects:—

"The Heavy Horse."
"Milking Shorthorns."
"Breeding and Feeding Beef Cattle."
"Alfalfa and Corn."
"The Importance of Type in Live Stock."
"Is Farming Worth While?"

Moorehouse, R. L., Cairo, Ont.—Mr. Moorehouse is a successful farmer, who has had the advantages of college training. He has already done acceptable work in the Institutes and has assisted at special Judging Classes. He will be found a thorough master of the topics for which he is announced. Mr. Moorehouse will be prepared to give instruction in the judging of beef cattle and sheep.

Subjects:—

"The Breeding and Feeding of Beef Cattle."
"Alfalfa, the Scientific and Practical."
"The Control of Soil Moisture."
"Tile Drainage."
"Sheep Farming."

Evening:

"The Why of This and That."
"The Business End of Farming."

Murphy, **Robt.**, Alliston.—Mr. Murphy is one of the most successful and best known among the farmers and stockmen of Simcoe County. He has also taken a leading part in the public affairs of his county, working up to the Wardenship, and has had considerable experience in Institute work.

Subjects:—

"Soil Problems."
"Soil Cultivation and Drainage."
"Alfalfa Growing."
"Seed Selection."
"Selection and Feeding of Beef Cattle."
"Dual Purpose Cattle."

Evening:

"The Choice of Occupation."
"Some of the Needs of Ontario Agriculture."

Nixon, H. C., St. George.—Mr. Nixon's successful experience as a practical farmer, supplemented by his course in the Agricultural College and a deep interest in local agricultural organizations, insures up-to-date addresses and profitable discussions.

Subjects:—

"Soil Cultivation and Drainage."
"Building Up the Dairy Herd."
"Farm Management."
"Modern Machinery."
"Bee-Keeping."
"Heavy Horses."
"Swine."

Paget, J. N., Canboro, Ont.—Mr. Paget is well known in dairy circles through his connection with the Dairymen's Association of Western Ontario. He has been either director or president for a number of years, and is now a member of the directorate. Mr. Paget is particularly well known in his own district for the aggressive and up-to-date methods he has adopted in conducting his dairy business. He is not only a thoroughly practical man, but is capable of presenting the results of his experience in a clear and forceful manner.

Subjects:—

"Care and Production of Milk."
"Profit and Loss in Dairying."
"The Growth of Alfalfa and Its Importance to Dairymen."

Evening:
"The Relation which should exist between Producer, Proprietor and Maker."

Peart, Grant S., Burlington, Ont.—Mr. Peart, of Burlington, is a graduate of the Ontario Agricultural College, and has had the advantage of extensive practical experience upon one of the best Ontario farms, both before and subsequent to his course at the College.

Subjects:—

"Grass Seed Trade and Seed Control Act."
"The Apple Orchard."

Evening:
"Leaks on the Farm."

Ross, A. W., Blenheim, Ont.—Mr. Ross is a successful "mixed" farmer, keeping hogs, poultry, dairy cows and sheep, specializing in the first two. He has had extended experience as a judge at fall exhibitions, and was active in organizing and installing a local telephone system.

Subjects:—
"How to Improve Present Farm Conditions."
"Hog Raising."
"Poultry for Profit."
"Farm Telephones: How to Build and Maintain Them."
"The Best Means of Keeping Earth Roads in Good Repair."

Schuyler, C., Brantford.—A thorough practical knowledge of general farming, combined with an Associate Course at the Ontario Agricultural College, has made Mr. Schuyler a valuable acquisition to the Institute staff.

Subjects:—

"Alfalfa."
"Dairy Cattle."
"The Cultivation of Corn and the Silo."
"Horse Breeding."
"Fruit Growing and Management of Orchards."

Shearer, W. C., Bright.—Dairying is the particular department of farming in which Mr. Shearer has been eminently successful. He has kept records of the feed consumed by the hogs produced, and will be able to give information of much value regarding the feeding of sweet pasteurized whey in conjunction with other foodstuffs,. He is thoroughly practical, a good speaker, an Institute man of experience for some years past, and a most acceptable delegate. As will be seen from his subjects, Mr. Shearer is also prepared to discuss the bacon, seed and corn questions.

Subjects:—

"General Farm Management."
"Rotation of Crops and Selection of Seed."
"Breeding and Feeding the Bacon Hog."
"Breeding Dairy Cows and Feeding for Milk."
"Tile Underdraining."

Evening:
"Interesting the Boys in the Farm."
"Successful Farm Management."

Sirett, H., R.R. No. 4, Brighton.—Mr. Sirett is a College graduate, with successful experience as a District Representative, an official of the Seed Branch of the Dominion Department of Agriculture, and later as a practical farmer who keeps in close touch with up-to-date agriculture, especially in so far as pure seed and the production and handling of apples are concerned.

Subjects:—

"Seed Grains, Selection and Improvement."
"Crop Rotations for Increased Yields."
"Farm Yard Manure—Where and When to Apply It."
"Growing Corn for Ensilage."

Smith, A. R. G., New Hamburg.—Mr. Smith is one of the leading farmers in one of the best agricultural sections of the Province. He has taken part in club work, improvement of schools, and other activities intended for the betterment of the farmer's condition. Mr. Smith is a member of the County Board of Agriculture for Waterloo County, and has been of material assistance to the District Representatives in furthering the work of that Branch.

Subjects:—

"Field Crops and Rotations."
"Beef Cattle and Milking Shorthorns."
"The Dairy Industry."
"Seed Control Act and Inspection Work."
"The Work of Farmers' Clubs."

Evening:
"The Problems of the Young Agriculturist."

Smith, C. B., Smithdale, Ont.—Mr. Smith lives on a farm where mixed farming is practised and a herd of registered Shorthorn cattle kept. He has had experience in reclaiming an old orchard. He has always taken a keen interest in the Farmers' Institutes and other agricultural organizations, and is a strong advocate of Farmers' Clubs.

Subjects:—

"The Breeding and Feeding of Beef Cattle."
"Crop Rotation and Control of Soil Moisture."
"Alfalfa and Other Clovers."
"The Care of the Apple Orchard—Spraying, Cultivation, etc."

Evening:
"The Farmers' Club as a Means of Education."
"The Bright Side of Farm Life."

Vansickle, P. O., B.S.A., Trinity, Ont.—Mr. Vansickle is a graduate of the Ontario Agricultural College, where he demonstrated his ability as a student by winning the Gold Medal for General Proficiency. After being graduated from College with honors, he settled on his farm, where he has been as successful as when at College. Mr. Vansickle is eminently qualified to discuss subjects dealing with practical farm operations, as he is a skilled agriculturalist and stockman.

Subjects:—

"Increasing the Fertility of the Soil."
"Breeding and Feeding of Live Stock."
"Alfalfa Growing."
"Seed Selection."
"The Control of Soil Moisture."
"Weeds and Their Treatment."
"Farm Drainage."

Wesbrook, A. E., Oakland, Ont.—Mr. Wesbrook has for many years taken a keen interest in the agricultural activities of his district, having been President of the South Brant Farmers' Institute for some years. In 1912 he secured first prize on his orchard in a competition embracing nine counties. The farm upon which he lives has been in the Wesbrook family since coming from the Crown and is a striking example of the effect of system, thoroughness, hard work and an eye to the beautiful.

Subjects:—

"General Farm Management."
"Corn and Hogs."
"Apple Growing."
"Potato Growing."
"Poultry Keeping for the Average Farmer."

Evening:
"The Country Home."

Women's Institute Lecturers and their Subjects

Backus, Dr. Annie, Aylmer.—Dr. Backus is a practising physician, who has taken a keen interest in Institute work in Elgin County, and in addition has been assigned by the Department to lecture in other parts of the Province. She is eminently practical, ready and willing to help womankind.

Subjects:—

"Consumption and Its Prevention."
"Physical and Mental Harm of Fault Finding."
"Health and How to Procure It."
"The Medical Inspection of Public Schools."
"The Physical Development of the Child."
"Education and What It Means."
"The Importance and Meaning of Woman's Work."
"War and Its Relation to Women."

Brethour, Mrs. J. E., Burford.—Mrs. Brethour has been a leader in the Institutes of Brant County for a number of years, with the additional experience of representing the Department in other sections of the Province. Her addresses are animated, interesting and instructive, and are specially helpful to those who are responsible as officers of the Institutes.

Subjects:—

"The Advantages of Country Life."
"Simple Entertaining in the Country."
"Timely Hints for Housekeepers."
"Is a Woman's Time Worth Anything?"
"The Evolution of the Country Woman."

Campbell, Miss Susie, 112 Oakwood Avenue, Toronto.—Miss Campbell is an Institute worker of considerable experience, who always leaves her audiences enthusiastic in pursuing definite lines of work. She is untiring in her faithful efforts to leave with her hearers noble thoughts and sentiments in keeping with their tastes and surroundings. Miss Campbell is an ex-teacher, and has judged dairy products, needle work and fine art at many of our fall fairs. She has done much to stimulate branches in many parts of the Province to better work. Miss Campbell is prepared to address Public and High School pupils, and has suitable subjects for each grade.

Subjects:—

"Individual Life of a Young Woman."
"Influence of Women and Men."
"The Judicious Housekeeper and Homemaker."
"Home and School; The Ideal Country School."
"The Duties and Opportunities of Canadian Women."
"How Women Can Aid Agriculture."
"The Educated Farmer, His Possibilities."
"How to Promote Rural Sociology."

Chapman, Miss E. M., 22 Radford Avenue, Toronto.—Miss Chapman went from a farm home to teach school, and subsequently took a course in Domestic Science at Macdonald Institute, Guelph. Miss Chapman's experience as a Demonstration-Lecturer in connection with the Women's Institutes and a magazine writer, places her in a position to give up-to-date information along the lines announced below.

Subjects:—

"Building, Making-over, Decorating and Furnishing the Farm Home."
"She Just Keeps House for Me."
"The Problems of the Girl on the Farm."
"A Man and His Mother."
"The Institute and Community Education."

Coutts, Mrs. K. B., Thamesville.—Mrs. Coutts has taken an active interest in Institute work, not only in her local branch, of which she has been an officer for several years, but also throughout the surrounding district. Her experience as a public school teacher in town, city and country, and in connection with the work of Historical Societies, Study Clubs, etc., will enable her to present most valuable information and suggestions to the Institutes.

Subjects:—

"Social Life and Education in the Rural Districts."
"The Legal Status of Women in Ontario."
"The Economy of Child Saving."
"The Women's Institute as a National Asset."
"Pioneer Days."
"The Woman's Part in the World War."

Fotheringham, Dr. S. L., 73 Walmsley Blvd., Toronto.—Dr. Fotheringham is a graduate in medicine of Toronto University. She took a year of post-graduate work in a Philadelphia Hospital; and made a special study of children's work, especially Infant Feeding, in London, England. Apart from medical work she is much interested in nature study and outdoor life in its relation to health and development of children and adults. At present she has charge of one of the city "Welfare Baby Clinics" and is giving a series of talks to various Mothers' Meetings and Women's Clubs.

Subjects:—

"The Care and Feeding of Infants."
"The Care of Sick Babies."
"First Aid—Emergencies."
"Life Principles."
"The Power of Thought."
"Nature Study and Life Truths."
"Study of Bird and Insect Life: as a Hobby; as an Economic Factor of Orchard and Garden."

Gilholm, Miss B., Bright.—Miss Gilholm has a thorough training along Dairy lines, with a good deal of practical experience. Miss Gilholm's knowledge and appreciation of country life, together with her experience as an officer and lecturer in connection with the Institutes, insures service appreciated by the members in general. Her deep interest and study of Community Improvement activities places her in a position to give advice as to the best utilization of the opportunities and forces at hand.

Subjects:—

"Soft and Fancy Cheesemaking" (Demonstrated).
"First Aid, Emergencies, Home Nursing."
"The Stranger Within Our Gates."
"Our Privileges and Responsibilities as Canadian Women."
"Our Opportunity."

Hunter, Mrs. W. J., R.R. 2, Brampton.—Mrs. Hunter has been identified with the Institute work since its inception. She is the mother of a large family and lives on a farm, and will, therefore, be able to give advice of a most practical and valuable nature. Mrs. Hunter has for some months been convener of a lrage Patriotic League and is in a position to give valuable advice and assistance along Red Cross and other patriotic lines.

Subjects:—

"Benefits of Institute Work."
"Training Children in the Home."
"The Daughter's Education."
"Don't Worry."
"Improvement of Home Conditions."
"Homemakers and Patriots."
"Butter-making on the Farm."

McClure, Miss Ethel W., Brampton.—Miss McClure is a graduate of Toronto General Hospital and has had several years' experience in private nursing, with some experience in Institute work. Her subjects are treated in a way that all may understand and should be of value to the average person.

Subjects:—

Afternoon:
"Nursing of the Typhoid Fever Patient."
"Nursing of Contagious Diseases."'
"Obstetrical Nursing and Care of the New Born Babe."
"Demonstration of Bathing a Bed Patient, Showing How to Change the Linen."

Evening:
"True Patriotism."
"Emergencies in Every-day Life."

Miss McClure will be prepared to give a practical demonstration of bathing a bed patient. For this demonstration it will be necessary to provide the following:

An ordinary bed made up, or a stretcher, or a long table.
An extra sheet to show how they are changed.
Towels—Two bath and a face towel.
Wash cloth, soap, basin.

Moorehouse, Mrs. R. L., Cairo.—Mrs. Moorehouse is a graduate optician. She is well and favorably known as an enthusiastic and efficient worker in local organizations, and several years' experience as a lecturer for the Department has shown her to be a practical and fluent speaker, her work being much appreciated.

Subjects:—
"The Care of the Eyesight."
"A Mother's Influence."
"What the Other Institute is Doing."
"Our Flag and What is Stands For."
"Womanly Footsteps."
"Keep on the Sunny Side."
"For Home and Country."
"Held in Trust."

Parsons, Mrs. H. W., "The Northlands," Cochrane, Ont.—Mrs. Parsons has had wide experience in connection with the Women's Institute and various other societies, including the National Council of Women. She has also lectured in Vermont, U.S.A., and given acceptable service in the "Patriotism and Production Campaign." Mrs. Parsons will be prepared to address the children in the schools in the mornings where opportunity affords.

Subjects:—

Morning (for the schools):
"The Call of the Wild."
"Boys' and Girls' Clubs."
"Silk and Silkworms."
"The Furred and Feathered Things."
"My Country."

Afternoon:
"Our Canadian Women."
"Women in Industry."
"Women Workers of Our Time."
"Women and Money."
"Women and Dress."
"Marriage."
"Magnetism of Personality."
"Canadian Laws Concerning Women and Children."
"The Chatauqua Reading Course."
"The Economic Life of our Dominions."

Evening:

"Made in Canada."
"Women and War."
"Brave Belgians—The Country—Its People."
"The Little Nations of the Earth."
"The Patriotic Work of the Institutes."

Powell, Miss M. V., Box 453, Whitby.—Miss Powell is deeply interested in everything which pertains to the advancement and education of the present and future nation-builders. She has had several years' experience in Institute work in Ontario, and also spent some time in establishing the work in New Brunswick. She is much interested in school problems, occupying a seat on the local Board of Education. The logical, pleasing and forceful manner in which Miss Powell presents her elevating and instructive addresses appeals effectively to her audiences.

Subjects:—

"Present Day Need."
"Good Citizenship."
"How We Can Help Our Boys and Girls."
"Refinement in the Home."
"Our Debts: How Much Owest Thou."
"Schools."
"Canada's Opportunity."
"National Needs To-day and After the War."

Smith, Dr. Mary McKenzie, Gravenhurst.—Dr. McKenzie-Smith has for a number of years been a close student of rural life and problems. She has also taught school and in recent years has had wide experience along medical lines, especially in the treatment of women and children. She is also much interested in Social Service work.

Subjects:—

Afternoon:

"The Home Care of the Sick" (Demonstrated).
"Tuberculosis—Prevention, Care and Cure."
"The Proper Diet and Care of Children."
"Crossing the Bridges with Our Children."
"What Every Woman Ought to Know."
"The Child—a Possibility."

Evening or Afternoon:

"Life in the Orient."
"The Value of Reading."
"Medical Inspection of Rural Schools."
"The Opportunity of the Home on the Farm."

Stephen, Mrs. Laura Rose, Huntington, P.Q.—Mrs. Stephen needs no introduction to the Women's Institutes of Ontario. Her ability as a public speaker and her wide knowledge of affairs place her in a position to render the best of service to the Institutes. Mrs. Stephen has travelled from the Atlantic to the Pacific in connection with Institute and other instruction work along homemaking and dairy lines. Her practical and carefully thought-out addresses, delivered in a pleasing and forceful manner, have placed her in the front rank of Institute workers. Mrs. Stephen is well known as a writer on dairy topics, and has published a book on "Farm Dairying."

Subjects:—

"The Dairy Cow."
"Woman's Part on a Dairy Farm."
"The Influence of Environment."
"House Building and Home Making."
"My Country, My District, My Home."
"Patriotism and Home Production."
"The Ideal Institute."

Sutherland, Miss Davina M., Embro.—Miss Sutherland is a graduate in Domestic Science from Macdonald Institute, Guelph, and a public school teacher of considerable experience. For two years she has been instructor in Dietetics in Johns Hopkins Hospital, Baltimore, Maryland.

Subjects:—
"Economy in the Home."
"Ventilation, Sanitation and Hygiene."
"Health from a Dietary Standpoint."
"Educating the Boys and Girls."
"The Advantages and Possibilities of Country Life."
"Our Influence—and Making the Most of Our Opportunities."
"Women and the War."

Watts, Mrs. F. W., 51 Chicora Avenue, Toronto.—Mrs. Watts has had marked success both as an Institute officer and lecturer. She is a forceful, pleasing speaker, whose addresses have been much appreciated. Mrs. Watts is able to give many valuable and helpful health hints.

Subjects:—

Afternoon:
"Beauty of Person and Character."
"The Conservation of Health."
"A Talk with Mothers and Girls."
"What Are You Doing to Help Your Institute?"

Evening:

"Why Is It?"
"Your Influence in the Home."
"Wearing Apparel and Household Articles"—Demonstration in cutting and Making. (Bring papers and scissors).

Yates, Miss Mary, Port Credit.—Miss Yates is one of the recognized poultry authorities of the Province, having been employed to a considerable extent during the past several years in addressing special poultry meetings. In addition to this Miss Yates has had wide experience in training along horticultural lines. She is a most capable platform woman and the Institutes may expect up-to-date information presented in an attractive, impressive manner. Miss Yates at the present time holds the Institute Gold Medal at Port Credit for hardy herbaceous perennials, and will be prepared to give information upon the management of small flower shows and vegetable competitions, which have been a feature of the work in the Institute with which she has been identified.

Subjects:—
Poultry Subjects.
"Up-to-date Methods of Chicken Rearing."
"Egg Production in Winter."
"Dressed Poultry—the Preparation for Market."
"Poultry for Townspeople."
"Profitable Branches of Poultry-keeping for Farmers."

Horticultural Subjects.
"Vegetable Gardens for Young People."
"A Garden of Flowers from Seed."
"The Old-fashioned Hardy Flower Borders."
"Outdoor Pictures Around the Home."
"A Chat About Roses."
"The Duty of Women in War Time."

Demonstrations.

Miss Yates will be prepared to give demonstrations as indicated below. For demonstrations 5 and 6 the demonstrator will provide the necessary equipment.

General Requirements.
1. Substantial table, not too high.
2. A dozen newspapers.
3. A cloth and a bowl of water.

1. Killing: (*a*) By dislocation of the neck.
   (*b*) By stabbing.

Special Requirements.—Live bird that has been fasted at least 24 hours at time of demonstration, and a good sized receptacle for feathers.

2. Trussing for Roasting.

Special Requirements.—A bird that has been killed after fasting at least 24 hours. It should have been dry picked and the head and feet should be left on. The bird should be cold at the time of demonstration, but should not have been killed more than a few days.

3. Boning a Fowl.

Special Requirements.—A bird that has been killed after fasting 24 hours and then dry picked.

N.B.—*The bird must on no account be drawn.*

4. Carving.

Special Requirements.—A whole cooked young bird and a sharp carving knife and fork.

N.B.—*The bird should be placed upon a large dish.*

5. The Market Egg and Its Variations.
6. Candling Eggs.

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